SIEMENS

# SIMATIC MMI

# ProTool/Lite Configuration Software

**User's Manual**

**6AV9623–1BB05–2AB0**

**Release 09/96**

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Order No. 6AV9623–1BB05–2AB0

# Preface

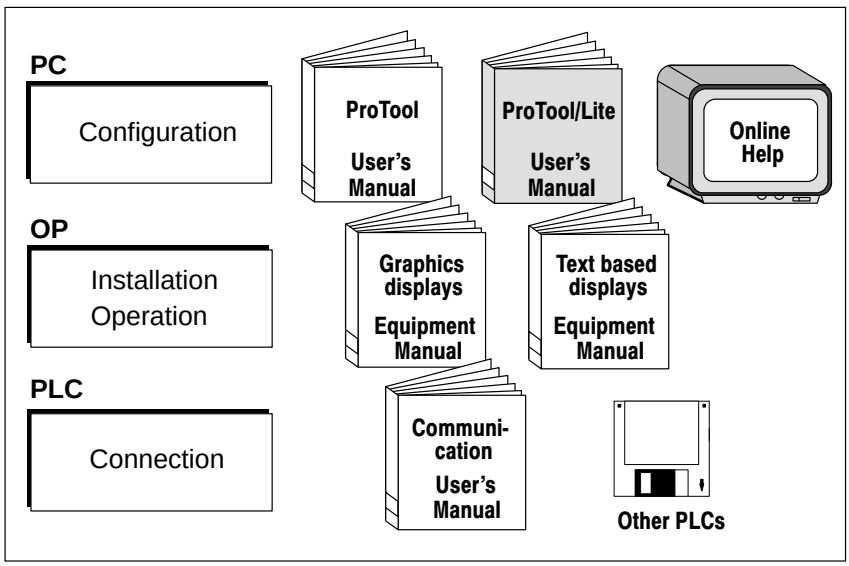
## Purpose

ProTool/Lite is used to configure Operator Panels (OPs) having text based displays for specific systems. The *ProTool/Lite* User's Manual explains how you run the configuring tool ProTool/Lite and what configuration means. The manual is valid for configuring the following devices:

– OP3
– OP5
– OP7
– OP15
– OP17
– C7-623
– C7-624

## How it fits in

The manual is part of the SIMATIC MMI documentation. It includes the manuals for the configuring tool, the Operator Panels and communication between the PLC and the OP. Below, you will find an overview diagram and a description of when you require the different manuals.



| Document Type | Target Group | Contents |
|---|---|---|
| Getting Started<br>Product Brief | Beginners | This document guides you step by step through the configuration of<br>• a screen containing static text<br>• a screen containing an input/output field and a bar graph<br>• changing from one screen to another<br>• a message<br>A document is available for each of the following:<br>– OP3, OP5, OP15<br>– OP7, OP17<br>– OP25, OP35, OP45 |
| ProTool<br>User's Manual | Configurer | Provides information for working with the ProTool configuring tool.<br>It contains<br>• basic rules for configuration<br>• a detailed description of objects and functions that you can configure<br>• examples of configuring objects<br>This document is valid for OPs having graphics displays. |
| ProTool/Lite<br>User's Manual | Configurer | Same contents as the ProTool User's Manual. This document is valid for OPs having text based displays. |
| ProTool<br>Online Help | Configurer | Provides information on your computer (PU or PC) screen for working with the ProTool configuring tool. The online Help is context-sensitive and contains<br>• a general description of the editors to be found in ProTool<br>• a detailed description of the different fields in the dialog boxes<br>• a comprehensive description of the functions |

| Document Type | Target Group | Contents |
|---|---|---|
| Example Application Commissioning Instructions | Beginners | Example configurations are supplied with ProTool together with the associated PLC programs. This document describes<br>• how you load the examples onto the OP and the PLC<br>• how you can run the example<br>• how you can upgrade the connection for your application |
| OP37 Equipment Manual<br>OP25, OP35, OP45 Equipment Manual<br>OP7, OP17 Equipment Manual<br>OP5, OP15 Equipment Manual | Commissioning engineers, users | Describes the OP hardware and general operation. It contains<br>• installation and commissioning<br>• a description of the OP device<br>• electrical installation with connection of the PLC, printer and configuration computer<br>• OP modes<br>• OP operation<br>• description of the standard screens supplied with the software and their usage<br>• how to install options<br>• maintemance and replacement of spare parts |
| OP3 Equipment Manual | Commissioning engineers, users, programmers | Describes the OP hardware, generaloperation and the connection to a SIMATIC S7. |

| Document Type | Target Group | Contents |
|---|---|---|
| Communication User's Manual | Programmers | Provides information on connecting OPs to the following PLCs:<br>• SIMATIC S5<br>• SIMATIC S7<br>• SIMATIC 500/505<br>• block drivers for other PLCs<br>This document describes<br>• the configuration and parameters required to connect the OP to the PLC and to the network<br>• the user data areas used for exchanging data between the OP and the PLC |
| Other PLCs Online Help | Programmers | Provides information for connecting OPs to PLCs such as<br>• Mitsubishi<br>• Allen Bradley<br>• Telemecanique<br>The drivers for connections to these PLCs are located on separate floppy disks and are referred to as NATIVE drivers. Installation of a driver also installs the associated online Help. |

## How the manual is organized

This manual comprises four parts:

**Chapters 1–4** contain information of a general nature. This is information about what ProTool/Lite does, what functions ProTool/Lite supports, and how ProTool/Lite is installed and run under Windows.

**Chapter 5** describes the basic approach to configuration. You should study this chapter before you embark on configuration.

**Chapters 6–10** contain detailed information on how to configure different objects. Instructions are given on a step-by-step basis.

**Chapters 11–16** provide instructions on doing any of the following

- create a configuration in different languages
- print your configuration
- transfer your configuration to the OP
- copy or archive your configuration

## Conventions

The following conventions are used in this manual:

| | |
|---|---|
| VAR_23 | Typewriting identifies inputs or outputs as shown on the screen. They may be commands, filenames, entries in dialog boxes or system messages. |
| F1 | Names of keys are shown in a different type for identification purposes. |
| *File* → *Print* | Menu items are shown in this form. The whole path is always specified, showing how the menu item is accessed. |
| *Variable* | Dialog boxes as well as fields and buttons in dialog boxes are shown in italic type. |

## Applicability

The different issues of the User's Manual apply to the following ProTool/Lite versions:

| | |
|---|---|
| Issue 06/95 | Valid for ProTool/Lite versions up to and including 1.01 |
| Issue 12/95 | Extensions and revisions.<br>Valid for ProTool/Lite version 2.0 or later<br>and for ProTool version 2.0 or later |
| Issue 09/96 | Extensions for the OP7 and the OP17<br>Valid for ProTool/Lite version 2.5 or later<br>and for ProTool version 2.5 or later |

## Software and hardware versions

The following firmware releases are required for the Operator Panels:

- OP3 V1.00 or later
- OP5 V1.20 or later
- OP15 V2.20 or later
- OP7 V1.0 or later
- OP17 V1.0 or later

## Obtaining product support

In the event of technical queries, please get into touch with your point of contact at the Siemens agency or branch which takes care of your affairs. You will find the addresses in Appendix D *Siemens Worldwide*. In addition, you can call our hotline on *+49 (911) 895-7000 (Fax 7001)*.

## Abbreviations

The abbreviations used in the ProTool/Lite *User's Guide* have the following meanings:

| | |
|---|---|
| AG | Automatisierungsgerät (German for "PLC") |
| AM | Alarm Message |
| ANSI | American National Standards Institute |
| AS 511 | Driver of PU interface to the SIMATIC S5 |
| ASCII | American Standard Code for Information Interchange |
| DB | Data Block (on PLC) |
| DW | Data Word (on PLC) |
| EM | Event Message |
| EM | Equipment Manual |
| FW | Flag Word (on PLC) |
| LED | Light-Emitting Diode |
| MPI | Multipoint Interface (SIMATIC S7) |
| OLE | Object Linking and Embedding |
| OP | Operator Panel |
| PC | Personal Computer |
| PLC | Programmable Logic Controller |
| PPI | Point-to-Point Interface (SIMATIC S7) |
| PU | Programming Unit |
| RAM | Random Access Memory (working memory) |
| UM | User's Manual |

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# Introduction 1

**ProTool/Lite**

ProTool/Lite is an easy-to-use configuration tool for Operator Panels (OPs). It can run under Microsoft® Windows™. You can use a mouse or the keyboard to execute most actions that have to be performed in ProTool/Lite.

**Configuration**

Configuration consists in creating screens and messages and linking them to the PLC program. This means that the processes in the PLC can be visualized and manipulated.

**Screens and Messages**

Screens are used to create an image of the process with text and variables so that the operator can quickly grasp the relationships and intervene in the process, should this be necessary. Text explains individual elements on the screen. Variables are directly linked to the PLC and are used to display current values. By using variables, the operator can also write values to the PLC.

Messages draw the operator's attention to certain operating states, or they display malfunctions in process execution.

Screens have to be called. Messages are displayed automatically. They are initiated by the PLC.

**Keys**

Operator Panels have a system keypad and a function keypad. The system keypad contains the keys for operating the Operator Panel, such as cursor control and inputs. Functions can be assigned to the function keys during configuration. In this way the actual control sequence is implemented.

**Configuration data**

Configuration is performed on a PC or a programming unit (PU).
The configuration then has to be compiled under ProTool/Lite and downloaded to the OP. If there is link to the PLC, the OP displays the current values of variables. Figure 1-1 shows the different phases in which work is performed on configuration data.

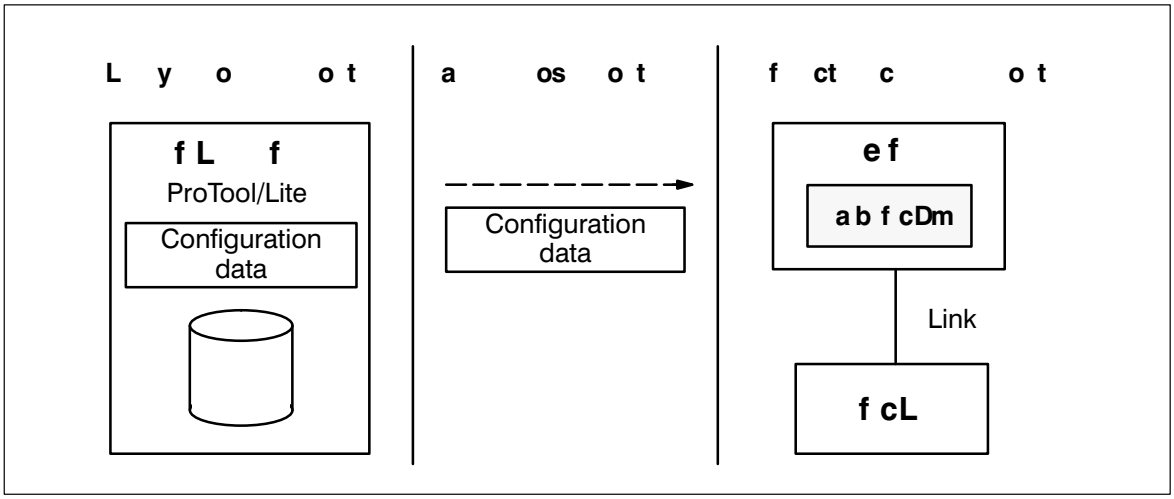



Figure 1-1 Configuration Phase, Download Phase and Process Control Phase

**Components of a configuration**

A configuration consists of different components, including:

- specification of the PLC and type of link
- general settings for the Operator Panel
- objects such as variables, screens and messages.

**Object types**

In ProTool/Lite, there is a separate editor for every type of object such as messages or variables. Different objects, which are given a symbolic name, are created under an object type. You have to specify this symbolic name when you edit, reference or delete the object.

**Printing a configuration**

Part or all of the configuration can be printed under ProTool/Lite. *Part* means that all the objects of a single object type, such as messages or variables, are printed.

# Installation

# 2

## System requirements

Table 2-1 shows the system requirements for running.

Table 2-1 System Requirements for ProTool/Lite

| Device | Required |
|---|---|
| CPU | 80486 SX/33 MHz |
| Main memory | 8 MB |
| Free space on hard disk | 2 MB in Windows directory<br>10 MB for ProTool/Lite |
| Graphics card | VGA |
| Floppy disk drive | 3.5 ” |
| Microsoft Windows | MS-Windows 3.1<br>MS-Windows for Workgroups 3.11<br>MS-Windows95 |

The system requirements depend on the operating system being used.

## Virtual memory

To improve performance, and thus speed, we recommend that you create virtual memory for Windows.

Virtual memory should be of the `Permanent` type and at least 15 MB.

Information is written temporarily from main memory to a file on your hard disk. This file is a hidden file which reserves storage space on your hard disk. When you require the information again, Windows loads it back into main memory.

## Methods of installation

You have to install ProTool/Lite under Windows. You can install it either from the floppy disks supplied to you or – for example, for networks – from your hard disk.

### STEP 7 integration

If STEP 7 version 2.0 programming software is available on your computer, you can install ProTool/Lite integrated in STEP 7. The advantages of doing this are as follows:

- You manage ProTool/Lite projects with the SIMATIC Manager, the same tool as you use for managing your STEP 7 projects.
- You can select STEP 7 symbols and data blocks from a text or graphic list as variables. The data type and the address are entered automatically.
- ProTool/Lite lists all the PLCs in your STEP 7 project and determines the address parameters once a PLC has been selected.

### Selecting a language

Before installation proper begins, the system asks you what language and options you wish to use. Installation begins in the same language in which you installed Windows or in English. After you have selected the language in which you want to have ProTool/Lite installed, installation is resumed in the language you specified. You cannot change the ProTool/Lite language in On-line mode. If you wish to be able to use the ProTool/Lite user interface in a different language, you have to re-install ProTool/Lite.

### Installing from floppy disk

To install ProTool/Lite, proceed as follows:

| Step | for Windows 3.0 or later | for Windows95 |
|---|---|---|
| 1 | Start Windows | |
| 2 | Insert the first floppy disk into the drive. | |
| 3 | Select in the File Manager the drive in which the floppy disk is inserted and double-click on the `setup.exe` program | Select in the Explorer the drive in which the floppy disk is inserted and double-click on the `setup.exe` program |
| 4 | A dialog box appears in which you can click, under *Options*, the software packages you wish to have installed. Perform modifications here only if you have ordered optional software packages. | |
| 5 | | Under *STEP 7* , select whether ProTool/Lite should be installed as *Integrated* or *Standalone*. |
| 6 | Follow the setup instructions on the screen. | |

## Options

Installation may be varied in its detail by installation options. With the options featured, the following components are installed:

| | |
|---|---|
| ProTool/Lite | is the program for creating configurations. |
| Optional PLC drivers | are drivers and examples for ”non-SIMATIC” PLCs and have to be ordered separately. |

## Installing from hard disk

To install ProTool/Lite from your hard disk, you must first copy the floppy disks to hard disk. In doing so, you must observe certain conventions.

ProTool/Lite consists of two components, which are also labeled differently. These components are:

- ProTool/Lite Software — Labeled on floppy disk as `ProTool/Lite`
- Optional PLC drivers — Labeled on floppy disk as `Driver`

Create a separate directory for all the different components and floppy disks, containing the name of the component and the number of the floppy disk. The directories have to be created in accordance with the labels on the floppy disks.

This means that you create for the ProTool/Lite software the directories

`\`*`PROLITE`*`\DISK`*`n`*

where *n* is the number of the floppy disk. For floppy disk *1*, you therefore create a directory called `\PROLITE\DISK1`; for floppy disk *2* you create a directory called `\PROLITE\DISK2`, and so on.

For the *Optional PLC Drivers*, create a directory called `\DRIVER\DISK1`.

## Icons in the program group in Windows 3.11

ProTool/Lite is installed in a program group of its own. When installation has been completed, you will see the following icons in the program group:

Double-clicking this icon launches ProTool/Lite.

For late breaking information about ProTool/Lite double-click this icon.

To call online Help, double-click on this icon. Online Help can also be called in ProTool/Lite by pressing key F1.

To modify Setup, double-click on this icon. You can modify Setup to install an option.

### The taskbar with Windows95

With Windows95, you call ProTool/Lite by means of the taskbar. The icons described under Windows 3.x will be found here as entries on the taskbar.

If you have installed ProTool/Lite to be *Standalone*, you will find it in the *Programs* folder. If you have installed ProTool/Lite to be *Integrated*, you will find it in the *Simatic* folder.

---

**Note**

Before you start work on a configuration, you should first read about the file structure created for ProTool/Lite and the significance of the standard screens supplied to you by consulting section 7.5.

---

# Device-Specific Functional Overview

# 3

**In this chapter**

The following tables present an overview of the

- objects (Table 3-1),
- general functions (Table 3-2)

that can be configured for the different devices.

Table 3-1 Configurable Objects

| Objects | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | **OP3** | **OP5 C7-623** | **OP7** | **OP15 C7-624** | **OP17** |
| **Screens** | Screen entries | Soft keys | x | x | x | x | x |
| | | Information text | – | x | x | x | x |
| | Input fields | Variable | x | x | x | x | x |
| | | Scheduler | – | – | x | – | x |
| | Output fields | Variable | x | x | x | x | x |
| | | Date | x | x | x | x | x |
| | | Time | x | x | x | x | x |
| | Input/output fields | Variable | x | x | x | x | x |
| | Character format | Flashing | x | x | x | x | x |
| | | Upper case | – | – | – | x[1] | x |
| | Attributes | Number | x | x | x | x | x |
| | | Directory | x | x | x | x | x |
| | | Start screen | x | x | x | x | x |
| | | Return to | x[2] | x | x | x | x |
| | | Title | x | x | x | x | x |
| | | Information text | – | x | x | x | x |
| **Event messages** | Standby message | Date | x | x | x | x | x |
| | | Time | x | x | x | x | x |
| | Output fields | Variable | x | x | x | x | x |
| | | Date | x | x | x | x | x |
| | | Time | x | x | x | x | x |
| | Attributes | Priority | x | x | x | x | x |
| | | Print | – | x | x | x | x |
| | Information text | | – | x | x | x | x |
| | Character format | Flashing | x | x | x | x | x |
| | | Upper case | – | – | – | x[1] | x |

[1] With OP15C and C7-624 having 8*40 characters only
[2] The only return possible is *BACK*.

Table 3-1 Configurable Objects

| Objects | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | **OP3** | **OP5 C7-623** | **OP7** | **OP15 C7-624** | **OP17** |
| **Alarm messages** | Output fields | Variable | – | x | x | x | x |
| | | Date | – | x | x | x | x |
| | | Time | – | x | x | x | x |
| | Attributes | Priority | – | x | x | x | x |
| | | Acknowledge | – | x | x | x | x |
| | | Print | – | x | x | x | x |
| | Information text | | – | x | x | x | x |
| | Character format | Flashing | – | x | x | x | x |
| | | Upper case[1] | – | – | – | x[1] | x |
| **Recipes** | Recipe entries | Information text | – | x | x | x | x |
| | Input fields | Variable | – | x | x | x | x |
| | Character format | Flashing | – | x | x | x | x |
| | | Upper case | – | – | – | x[1] | x |
| | Attributes | Number | – | x | x | x | x |
| | | Directory | – | x | x | x | x |
| | | Return to | – | x | x | x | x |
| | | Title | – | x | x | x | x |
| | | Information text | – | x | x | x | x |
| **Headers/ footers** | Message log | | – | x | x | x | x |
| | EM chronological | | – | x | x | x | x |
| | EM together | | – | x | x | x | x |
| | AM chronological | | – | x | x | x | x |
| | AM together | | – | x | x | x | x |
| | Overflow | | – | x | x | x | x |
| | Screen printout | | – | x | x | x | x |
| | Recipe | | – | x | x | x | x |
| | Output fields | Date | – | x | x | x | x |
| | | Time | – | x | x | x | x |
| | | Page number | – | x | x | x | x |
| | Character format | Underlined | – | x | x | x | x |
| | | Italics | – | x | x | x | x |
| **Scheduler** | Type | | – | – | – | x | x |
| | Scheduler time | | – | – | – | x | x |
| | Bit | | – | – | – | x | x |
| | Function | | – | – | – | x | x |

[1] With OP15C and C7-624 having 8*40 characters only

Table 3-1 Configurable Objects

| Objects | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | **OP3** | **OP5 C7-623** | **OP7** | **OP15 C7-624** | **OP17** |
| **Output fields** | Usage | Variable | x | x | x | x | x |
| | | Date | x | x | x | x | x |
| | | Time | x | x | x | x | x |
| | | Page number | – | x | x | x | x |
| | Display | Decimal | x | x | x | x | x |
| | | Hexadecimal | x | x | x | x | x |
| | | Binary | x | x | x | x | x |
| | | String | x | x | x | x | x |
| | | Decimal,decimal | x | x | x | x | x |
| | | Text symbol | x | x | x | x | x |
| | Field length | | x | x | x | x | x |
| | Variable | | x | x | x | x | x |
| **Input fields** | Usage | Variable | x | x | x | x | x |
| | | Date | x | x | x | x | x |
| | | Time | x | x | x | x | x |
| | | Scheduler | – | – | – | x | x |
| | Display | Decimal | x | x | x | x | x |
| | | Hexadecimal | x | x | x | x | x |
| | | Binary | x | x | x | x | x |
| | | String | x | x | x | x | x |
| | | Decimal,decimal | x | x | x | x | x |
| | | Text symbol | x | x | x | x | x |
| | Field length | | x | x | x | x | x |
| | Variable | | x | x | x | x | x |
| | Password level | | x | x | x | x | x |
| | Information text | | – | x | x | x | x |
| **Variables** | Format | | x | x | x | x | x |
| | Length | | x | x | x | x | x |
| | Polling time | | x | x | x | x | x |
| | Decimals | | x | x | x | x | x |
| | Address | | x | x | x | x | x |
| | PLC | | x | x | x | x | x |
| | Limit values | | x | x | x | x | x |
| | Variable | | – | – | x | – | x |
| | Functions | | x | – | x | – | x |
| **Soft keys** | Password level | | x | x | x | x | x |
| | Bit in variable | | x | x | x | x | x |
| | Functions | | x | x | x | x | x |
| **Function keys** | Password level | | – | x | x | x | x |
| | Function | | – | x | x | x | x |
| | Shift + Function | | – | x | x | x | x |
| | Set bit in LED assignment | | – | – | x | x | x |
| | Set bit in keyboard assignment | | – | x | x | x | x |

Table 3-2 Configurable General Settings

| General Settings | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | **OP3** | **OP5 C7-623** | **OP7** | **OP15 C7-624** | **OP17** |
| **PLC** | Standard clock pulse | | x | x | x | x | x |
| | Drivers | SIMATIC S5 – AS511 | – | x[1] | x | x[1] | x |
| | | SIMATIC S5 – FAP | – | x[1] | x | x[1] | x |
| | | SIMATIC S5 – SINEC L2–DP | – | x[1] | x | x[1] | x |
| | | SIMATIC S7 – 300/400 | x | x | x | x | x |
| | | SIMATIC S7 – 200 | x | x[1] | x | x[1] | x |
| | | FREE SERIAL | – | x[1] | x | x[1] | x |
| | | SIMATIC 500/505 | – | x[1] | x | x[1] | x |
| | Parameters | Depend on PLC | x | x | x | x | x |
| **Area pointer** | Interface area | | x | x | x | x | x |
| | User version | | – | x | x | x | x |
| | Screen number | | x | x | x | x | x |
| | Event messages | | x | x | x | x | x |
| | Alarm messages | | – | x | x | x | x |
| | PLC acknowledge | | – | x | x | x | x |
| | OP acknowledge | | – | x | x | x | x |
| | Recipe number | | – | x[1] | x | x[1] | x |
| | Data mailbox | | – | x[1] | x | x[1] | x |
| | Recipe mailbox | | – | x[1] | x | x[1] | x |
| | Successive recipe mailbox | | – | x | x | x | x |
| | System keyboard | | x | x | x | x | x |
| | Function keyboard | | – | x | x | x | x |
| | LED assignment | | – | – | x | x | x |
| **Parameters** | Messages | Printout | – | x | x | x | x |
| | | Alarm messages: | | | | | |
| | | – First/Last | – | x | x | x | x |
| | | – Separate/Together | – | x | x | x | x |
| | | Language-dependent characters for: | | | | | |
| | | – Messages in buffer | – | x | x | x | x |
| | | – Information text | – | x | x | x | x |
| | | Warn on buffer overflow | – | x | x | x | x |
| | Firmware | Device and firmware release | x | x | x | x | x |
| | Miscellaneous | User version | – | x | x | x | x |
| | | Time/date format | x | x | x | x | x |
| | | Superuser password | x | x | x | x | x |
| | | Contrast | – | x | x | x | x |
| | | Flashing input field | x | x | x | x | x |
| | | Display system messages | x | x | x | x | x |

[1] Not with C7-623 and C7-624

| General Settings | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | **OP3** | **OP5 C7-623** | **OP7** | **OP15 C7-624** | **OP17** |
| **Printer** | Interface | Type | – | x | x | x | x |
| | | Data bits | – | x | x | x | x |
| | | Parity | – | x | x | x | x |
| | | Stop bits | – | x | x | x | x |
| | | Baud rate | – | x | x | x | x |
| | Settings | Select printer | – | x | x | x | x |
| | | Parameters | – | x | x | x | x |
| **Languages** | Configuration possible in: | German | x | x | x | x | x |
| | | English | x | x | x | x | x |
| | | French | x | x | x | x | x |
| | | Italian | x | x | x | x | x |
| | | Spanish | x | x | x | x | x |
| | | Russian | – | – | x | x[1] | x |
| | Languages loaded simultaneously on the OP | 3 configuration languages | x | x | x | x | x |
| **Download using** | Serial interface | | x | x[2] | x | x[2] | x |
| | MPI | | x | x[3] | – | x[3] | x |

1 Not possible with OP15A
2 Not possible with C7-623 or C7-624
3 Possible with C7-623 and C7-624 only

# Working with Pro Tool/Lite

# 4

This chapter contains a general description of how to run Pro Tool/Lite. This description is not a substitute for the general Windows documentation.

## 4.1 General Remarks

Pro Tool/Lite is primarily designed to be run with a mouse. The different editors are provided with special tool bars that have editor-specific buttons. These tool bars are shortcuts to frequently used functions.

You can also configure ProTool/Lite using the keyboard.

The following sections tell you how to handle mice and keyboards.

### Working with a Mouse

Under Pro Tool/Lite, you always use the left mouse button to operate the mouse.

In the Pro Tool/Lite documentation, the following terms are used for working with a mouse:

| | |
|---|---|
| **Click** | The mouse button is pressed and released. |
| **Drag** | The mouse button is pressed and held down, the cursor is moved to its new position, and the mouse button is released. |
| **Double-click** | The mouse button is pressed twice in rapid succession. |

### Working without a Mouse

If you work without a mouse, the same key conventions apply in ProTool/Lite as in Windows.

The key combinations valid for ProTool/Lite have the following functions in the message, screen and recipe editors:

| | |
|---|---|
| SHIFT + left | Select one character on left |
| SHIFT + right | Select one character on right |
| Strg + Arrow | Next configured message |

On some menus, the menu items are followed by details of keys and key combinations. If you press this key or key combination, the menu item is initiated. You must not choose the menu in advance.

If menu items, symbols or buttons are displayed in gray, you cannot execute these functions.

## 4.1.1 Opening Several Configurations and Editors

**Opening several configurations**

Under Pro Tool/Lite, you can open several configurations and editors simultaneously. You can copy data to and from a configuration via the Clipboard. This facilitates work since you do not have to re-configure all the data.

**Opening several editors**

The same applies to editors, for you can also open several editors simultaneously. You can also open an editor several times over, thus being able to work at different points in the editor.

**Active window**

A window is opened every time you select a configuration or an editor.

You can always edit the active window. You can recognize an active window by the color of its title bar, which is different from that of the other windows (Figure 4-1).

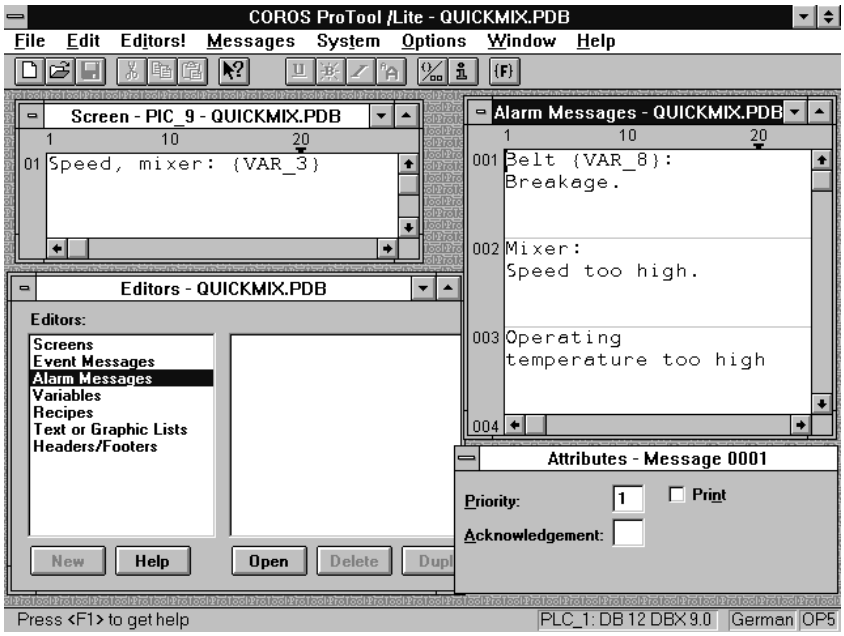



Figure 4-1 Pro Tool/Lite Screen with Several Open Windows

## 4.1.2 Using Online Help

**Purpose**

Online Help is a complete reference tool which you can choose at any time while you are configuring. By using online Help, you obtain information in dialog boxes about menus, ranges of values etc.

**Calling online Help**

You can call online Help in several different ways:

F1

You can always press F1 in Pro Tool/Lite to consult on line Help. Online Help is automatically called for the editor in which you happen to be working or for the dialog box you selected.

Context-sensitive

Clicking the Help button (↑?) on the tool bar transforms the cursor into an arrow with a question mark. Clicking this cursor in Pro Tool/Lite on an item about which you would like to obtain more information calls online Help, and the corresponding position in online Help is displayed.

The items you click may be dialog boxes, menu items or buttons on the menu bar.

If you are not working with a mouse, you can activate context-sensitive Help by pressing SHIFT + F1.

Help menu

You can call online Help by choosing the *Help* → *Contents* menu. The first page of online Help is then displayed.

**Online Help window**

Figure 4-2 shows an example taken from Online Help:

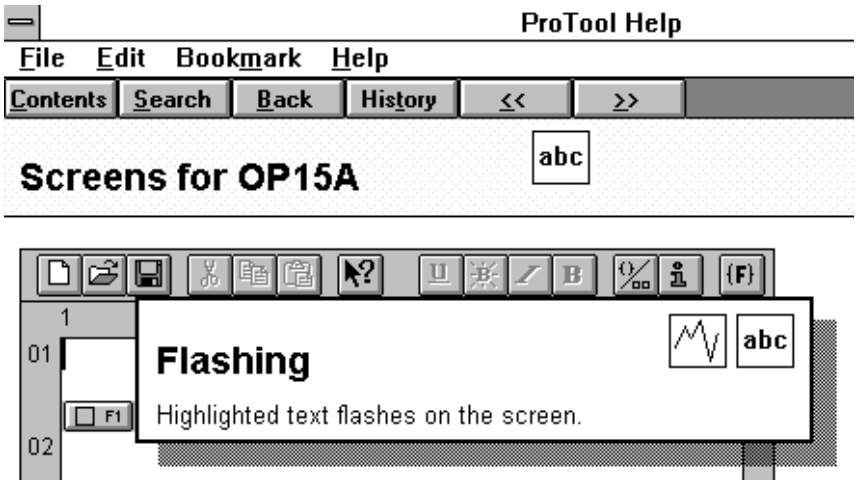



Figure 4-2 Online-Help

### Green text

A green, underlined topic identifies a button which references another topic. If you click this button, the new topic is displayed in a different window.

A green, dotted underlined topic denotes a button which references a brief explanation. Clicking the cursor on this button displays a window containing the information. The window is hidden by clicking anywhere on its surface.

### Jump in screen dumps

Furthermore, online Help frequently displays screen dumps of Pro Tool/Lite, i.e. editors, dialog boxes, etc. There are buttons under many of these screen dumps. If you press these buttons, you jump to other topics or call a superimposed window, where you can obtain further information.

If you click in online Help on a button or menu item in a screen dump which causes the Pro Tool/Lite software to branch to a dialog box, online Help also branches to the associated topic. If you click in online Help on a field in which an entry has to be made in the Pro Tool/Lite software, a window containing a description is superimposed.

### Displaying jumps

To make the buttons in screen dumps visible, press the following key combinations:

| | |
|---|---|
| CTRL + TAB | All invisible buttons are displayed while you hold down CTRL + TAB. |
| ESC + TAB | The first invisible button is displayed. Every time you press ESC + TAB, the next button is displayed. Pressing RETURN pushes the button. |

### 4.1.3 Status Bar in Pro Tool/Lite

**Purpose**

The status bar is the bar at the bottom of the screen. In Pro Tool/Lite, the status bar displays general information and editor-specific details.

The general information includes such items as the OP that you have selected or how you can call online Help. Editor-specific details, on the other hand, might be the language and the assignment of a message in the area pointer. Fig. 4-3 shows the status bar with messages.

Figure 4-3 Status Bar with Messages

**Displaying information**

In the status bar you can also display information about the functions of buttons or of menu items. To do so, click the item you require and press and hold down the mouse button. During this time the corresponding information will be displayed in the status bar. If you do not want to initiate the function, continue to hold down the mouse button and drag the mouse away from the selected item.

### 4.1.4 All Menus

**Menu bar**

There are various editing levels in the configuration. They are represented by main menu items.

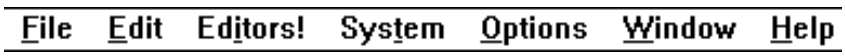



Figure 4-4 Menu Bar

**Main menu bar**

All the editing actions of an editing level are arranged under one main menu item. The main menu items are specifically:

*File* — All editing actions concerning the entire configuration are concentrated here. At this point you can, for example, open and save files, compile files and transfer them to the OP etc.

*Edit* — All editing actions concerning selected or highlighted sections of the configuration are concentrated under this main menu item. At this point you can, for example, cut, copy, insert etc. fields or text.

| | |
|---|---|
| *Editors!* | All the editors used for configuring the OP are concentrated here. At this point you can select the editor you want to work with – for example, for screens, event messages etc. |
| *System* | General settings for the OP are listed under this main menu item. At this point you perform settings for the link to the PLC program and PLC-specific settings, and you set area pointers etc. |
| *Options* | At this point you will find default settings and cross-references. |
| *Window* | All the editing actions for arranging the windows of ProTool/Lite are located here. You can select – for example – the window you want to have in the foreground, or you can arrange all open windows on the screen, etc. |
| *Help* | By choosing Help, you go to online Help. You can find information by searching for Help topics (*Contents*). |

### Editor-dependent menu items

Editor-dependent menu items appear only when the corresponding editor is called. All the editing actions specific to that editor appear under these menu items. The following menu items are involved:

| | |
|---|---|
| *Screen* | At this point you can, for example, select screen attributes, create fields, define character formats, etc. |
| *Messages* | Under Messages, you can, for example, edit variables or information text, open additional windows, etc. |
| *Headers/Footers* | Headers and footers can be edited for the printout on the OP. |
| *Recipe* | This menu item allows you, for example, to create fields, edit information text, recipe attributes and character formats, etc. |

## 4.2 Tool Bar

**Purpose**

Some functions can be accessed not only on menus but also directly on the tool bar at the top border of the screen. The buttons are self-explanatory and represent shortcuts.

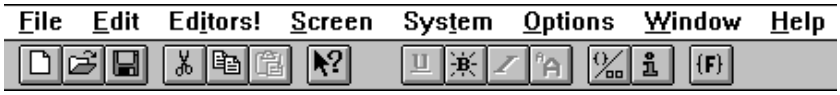



Figure 4-5 Tool Bar in Screen Editor

**Summary of functions**

Below, a description is given of all the buttons on tool bars:

| | | |
|---|---|---|
| | New | Open a project with the default settings. |
| | Open | Open an existing project. The *File Open* dialog box is opened. You choose the project you require from the dialog box. |
| | Save | Save a project under its name. If it is a new, unnamed project, the *Save As* dialog box is opened. |
| | Cut | Cut highlighted fields or text from the project and store them on the Clipboard. |
| | Copy | Copy highlighted fields or text in the project and store them on the Clipboard. |
| | Paste | Paste fields or text in the project from the Clipboard. |
| | Context-sensitive help | Show a special cursor. Click the cursor on the item about which you require information. Online Help is chosen. |
| | Character format | You assign a character format to highlighted text: underlined, flashing, italic, upper case. With *upper case*, the letters are two lines high (this attribute can be selected only for the OP15C having 8x40 characters). |
| | WYSIWYG mode | Toggle display of fields between symbolic name and actual length. |

Information text — The same editor can be used to configure information text for messages, screen and recipe entries. You use this key to toggle between edit mode and information text.

Insert field — With messages, screen and recipe entries, and headers and footers, you can also use fields. This button is used to insert a field.

## 4.3 General Settings

**Menu items** — You can customize Pro Tool/Lite while you are configuring. To do this, the following menu items are available to you:

*Options → Default Setting* — At this point you can modify the default settings of names and settings.

*Screen → Reference Text* — Select Reference Text and, for the active screen, the screen is displayed in the reference language. When you press the *Apply Text* button on the reference screen, all text strings on the reference screen are applied to the active screen.

*Messages → Attribute Window* — This menu item is used to display and hide the attribute window. In this window, you set different options which apply to just one message. This is its priority, for instance.

*Messages → Reference Text* — This menu item is used to display and hide the reference text window. Message text is displayed in the reference language in this window.

*Recipe → Reference Text* — This menu item is used to display and hide the reference text window. Recipe text is displayed in the reference language in this window.

*Headers and Footers → Reference Text* — This menu item is used to display and hide the reference text window. Header and footer text is displayed in the reference language in this window.

*Window* — Under this menu item, you will find settings for customizing your screen. This includes displaying more than one window on your screen simultaneously, for instance.

## 4.4 Information Functions

**Summary**

Pro Tool/Lite contains functions that provide information about the entire configuration. These items are listed below:

| | |
|---|---|
| *File → Project Information* | Here you will find general details relating to the project: Device, date crea ted, author etc. |
| *System → Memory Requirements* | Following compilation or download of a configuration, the storage space re quired for that configuration on the OP is displayed. |
| *System → Parameters → Firmware* | If there is a link to the OP, the current firmware release of the OP is dis played. |
| *Options → Cross–reference* | The objects that refer to each other are displayed. If, for example, you wish to delete a variable which is being used in a field, you find the associated field by means of Cross-Reference. Double-click on the specified field to have ProTool/Lite jump directly to the field. |

## 4.5 Dialog Boxes

### Settings

When you open a dialog box, only the essential settings are visible initially. Optional settings may be accessed by clicking a button. Clicking a button opens yet another dialog box, which may contain more buttons.

An example of the structure of a dialog box is shown in Fig. 4-6.

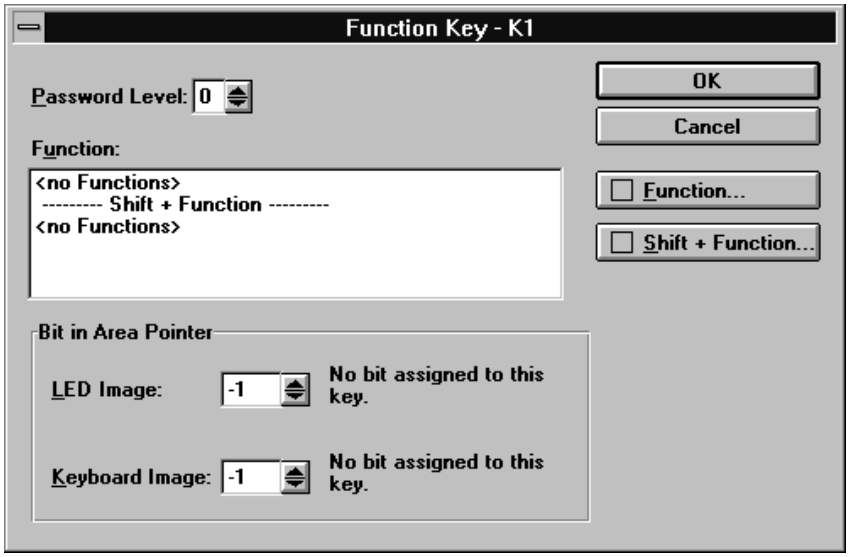



Figure 4-6 Function Key Dialog Box

A description is given below of all the points that you have to remember when you are using dialog boxes.

### Branching to other dialog boxes

If there is an ellipsis (...) behind a name on a button – for example, in Fig. 4-6 *Function...* – ProTool/Lite branches to another dialog box when you press the button.

If there is a check box in front of the name of the button, you branch by pressing the button to an optional setting – for example, in Fig. 4-6 *Function...*. You can tell from the check box whether a configuration is available in the dialog box: if there is a check mark in the check box, a configuration is available; if the check box is not checked, no configuration is available.

### Closing a dialog box

Dialog boxes contain either *OK* and *Cancel* buttons or a *Close* button.

In the first case, you have two options for closing a dialog box – you can close with or without saving.

To close a dialog box and to save any changes you may have made at the same time, you have to exit from the dialog box by pressing the *OK* button.

If you exit from the dialog box by pressing the *Cancel* button, any changes you may have made are lost.

In the second case, the *Close* button is used to close the dialog box. In this type of dialog box, any changes you may have made take immediate effect. In other words, changes do not have to be explicitly saved.

# Configuring with ProTool/Lite

# 5

**Device type**

You configure the different OPs in basically the same manner. Before you can start work on your configuration, you have to set the device type – for example, OP5. You are now offered only the functions that are available with this device type. You cannot modify the device type for this configuration once it has been set.

With the menu item *File* → *Convert*, you can convert configurations as follows:

- from an OP5 to an OP7 and
- from an OP15C to an OP17.

---

**Note**

Re-conversion is no longer possible.

---

**Object types**

The items that you configure are individual objects. We distinguish between different types of object, such as messages, screens, variables, etc. A separate editor is available for every type of object.

**Variables**

The link to the PLC is established by means of variables. Variables are used on screens and in recipes and messages to read values from the PLC and to display them on the OP. Similarly, variables may be used to write values to the PLC.

**Information text**

Information text can be configured to provide the OP operator with additional information about individual objects.

**General settings**

General settings for the system and the communication areas in the PLC have to be performed centrally.

**Compiling, downloading**

Upon completion, the configuration has to be downloaded to the OP. In this procedure the configuration is first compiled. *Compile* means that an OP-readable version is created.

# 5.1 Procedure for Configuration

**Introduction**

A configuration has to be created step by step. Certain steps are mandatory, others are optional.

An explanation is provided in the following of the different configuration steps in the order in which they have to be performed. This is followed by a list of the settings required for configuring different functions.

**Required details**

Figure 5-1 shows the basic details that have to be provided in respect of the Operator Panel and the Controller in a configuration. They in clude

- OP type,
- display resolution,
- type of PLC to which the OP will be connected,
- protocol which the PLC and OP will use to communicate with each other,
- communcation areas.

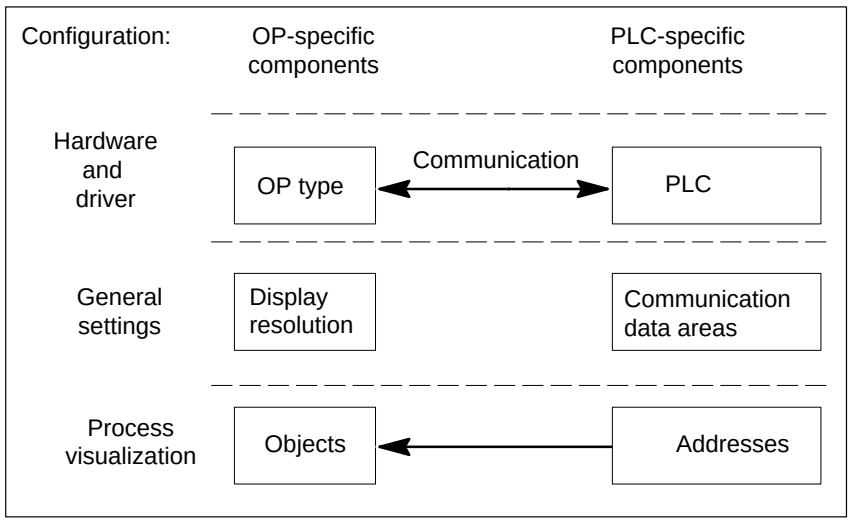



Figure 5-1 Basic Structure of a Configuration

**Objects**

The visualization of the process is performed by using objects, such as screens and messages. These objects are supplied with current values by the PLC. The values are set by means of addresses.

## Procedure

You create your configuration on a PC or PU and then download it to the OP. The procedure for configuration is specifically as follows:

1. **Set device type.**

   After a new configuration has been opened, the dialog box for selecting the device is opened. At this point you set the type of OP. The other items displayed by ProTool/Lite thereafter are device-specific.

   For the OP15C, you set the display resolution – the number of lines and the number of characters per line – at this point.

2. **Set PLC and communication protocol.**

   You must specify in the configuration the PLC to which the OP will be connected and the protocol which the OP and the PLC will use to communicate with each other. This is done by choosing *System → PLC* from the menu.

   The PLC dialog box is displayed. All settings performed at this point are saved under a symbolic PLC name. If you use a variable in an object, you specify this symbolic name for the link to the PLC.

3. **Enter communication areas (area pointers).**

   For the OP and the PLC to be able to communicate with each other, you must define commonly used data areas. These data areas are termed communication areas. They are entered by choosing *System → Area Pointers* from the menu. The communication areas you enter depend on the types of object that are being configured. Table 13-1 shows the dependencies.

   It is vital that you create the interface area for the SIMATIC S5 PLC under *Area Pointers*. You will find a detailed description in the*Communication User's Manual*.

4. **Configure objects.**

   Now, configure the messages, screens and recipes required by your process.

   You will find a detailed description of how to configure screens, messages and recipes in Chapters 7, 8 and 9.

   You can create variables, which make the link to the PLC possible, either directly by using the *variables* editor or you can leave them until such time as you configure individual objects. If, for example, you create an input field on a screen, you can call the dialog box for creating variables by pressing the *Edit* button.

5. **Compile configuration.**

   For the configuration to run on the OP, it must first be compiled. To do this, choose in ProTool/Lite *File → Compile* from the menu.

   During compilation, a check is made for inconsistencies in the configuration. One inconsistency might be, for example, that a particular type of object has been configured without the corresponding communication area having been created.

6. **Download configuration to OP.**

   You download the configuration to the OP by choosing *File → Download* from the menu. Should there be a current, compiled version already, it is downloaded. If a compiled version does not exist, the configuration is first compiled and then downloaded.

### Example for SIMATIC S5

To create a configuration for an OP5, proceed as follows:

1. Call the standard configuration for the OP5, `c:\prolite\standard\s_05.pdb`, and rename it by calling *File → Save As...* from the menu and save the standard configuration by giving it the project name `quickmix.pdb`.
2. Choose *System → PLC* from the menu to set the PLC.
3. Press the *Edit* button. The *Driver* dialog box now appears. We want to establish the connection is over AS511.
4. Press the *Parameters* button. The *SIMATIC S5-AS511* dialog box is now displayed.
5. Select in the *SIMATIC S5-AS511* dialog box, for example, *CPU Type:* `S5 115 CPU944`
   if you wish to connect the OP5 to that PLC.
6. If you close the dialog box by clicking *OK*, the settings are applied. Do exactly the same in all the other dialog boxes which you may have opened in the meantime. Exit from the *PLC* dialog box by clicking the *Close* button in order to apply all the settings.
7. Choose *System → Area Pointers* from the menu to configure the interface area, DB-TDOP.
8. In the *Type* field, you will see that *Interface Area* has already been selected. Press the *Add* key. A dialog box having the title *Interface Area* is opened.
9. Enter the following values in the *Interface Area* dialog box:
   *DB:* **51**, *Length:* **255**. This means that DB51 is the *Interface Area*.
10. Exit from the *Interface Area* and *Area Pointers dialog boxes* by choosing *OK* to save the settings.
11. Configure a screen (refer to chapter 12)
12. Choose *File → Save* from the menu to save the file.
13. Choose *File → Compile* from the menu to compile the configuration.
14. Connect the OP to your PC or PU. Choose *File → Download* from the menu to download the configuration to the OP.

## 5.2 Special Features of STEP 7 Integration

**STEP 7 integration**

If you have installed ProTool/Lite as being integrated, you can access the same database with ProTool/Lite as with the engineering tools of STEP 7. You assign your symbolism only once and use it everywhere. This saves you repeated inputs.

The communication parameters of the PLC are applied directly to your configuration. When you are configuring variables and area pointers, you access the STEP 7 text or graphic list.

**Calling ProTool/ Liteite**

You call ProTool/Lite as follows:

1. Start the SIMATIC Manager.
2. Select an S7 project or create a new one.
3. Choose *Insert* → *Hardware* → *COROS OP* from the menu. The ProTool/ Lite project OP1 is created.
4. Double-click on *OP1* to start ProTool/Lite.

You can copy, move and delete the ProTool/Lite project in the SIMATIC Manager.

---

**Note**

The project name and the object name in STEP 7 must be different or else an error message points out to you that the object cannot be saved.

---

**Using the symbol table**

When you are configuring variables, the STEP 7 symbol table is displayed for you. When you click on a symbolic name, the name and the complete address are applied automatically to the configuration.This is illustrated in Figure 5-2.

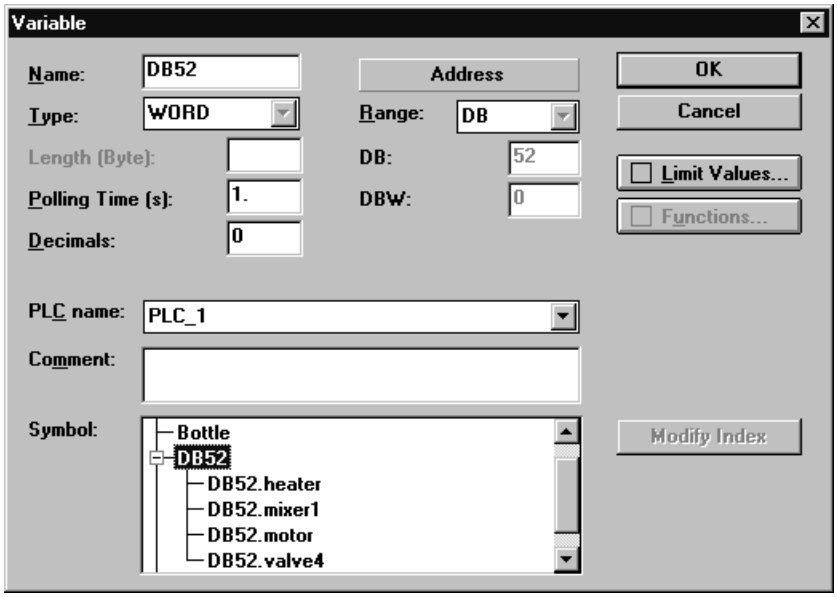



Figure 5-2 *Variable* Dialog Box with Embedded STEP 7 Symbol Table

## Selecting the PLC

Select the PLC in the way you normally would. For the parameters, the *SIMATIC S7 – 300/400* dialog box (refer to Figure 5-3) displays all the networks, CPUs and FMs available in the STEP 7 project. Once you have selected the network and the CPU by means of symbolic names, the parameters and addresses are entered for you automatically.

You can select the CPU symbolically only if you have placed it in an S7 station using the SIMATIC Manager, assigned parameters to it and networked it.

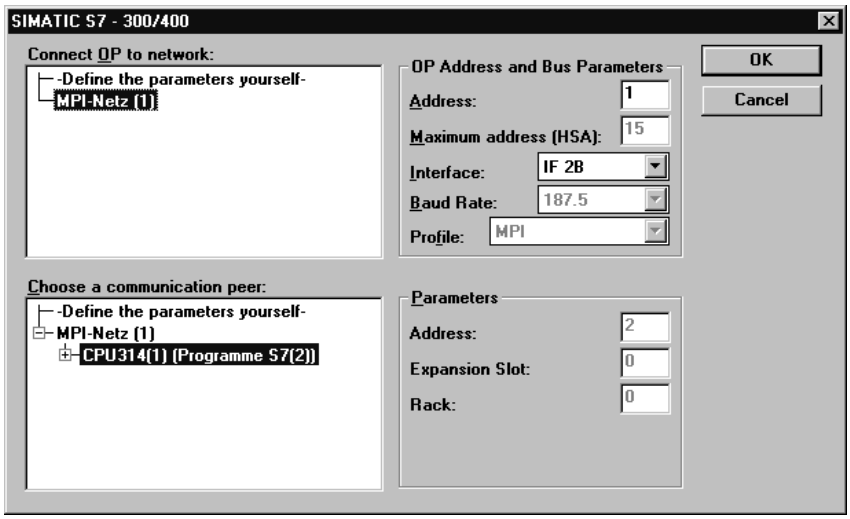



Figure 5-3 *SIMATIC S7 – 300/400* Dialog Box

If you have not yet created the configuration, you can type in the parameters. To type in the parameters, select *No Symbol*.

### Updating

The text or graphic lists and the address parameters are continuously updated via the symbolic link. STEP 7 modifications are applied immediately.

### Menu *File*

Choose menu items *File* → *New*, *File* → *Open* and *File* → *Save As*... in ProTool/Lite to open STEP 7 dialog boxes. By way of an example, Figure 5-4 shows the *Open* dialog box.

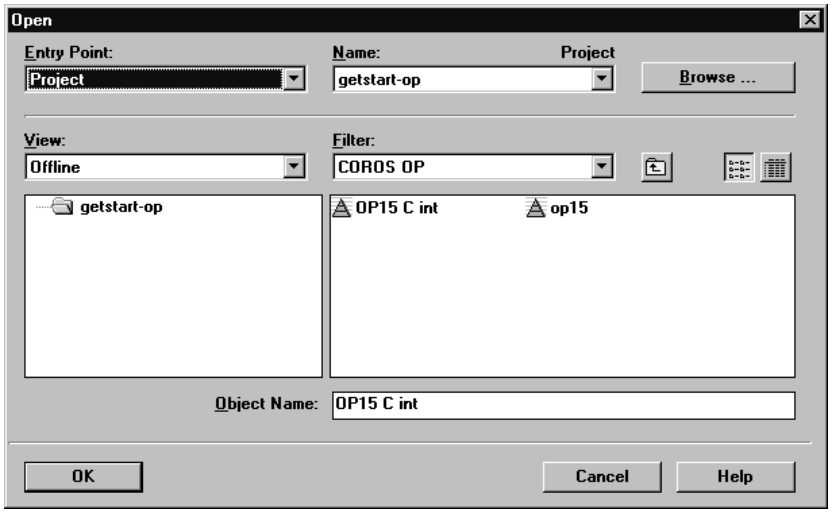



Figure 5-4 *Open* Dialog Box

In this dialog box, you can open ProTool/Lite projects. You can recognize ProTool/Lite projects by the icons preceding them

.

The dialog boxes for *New* and *Save As*... look alike, but they have different functions.

When opening a ProTool/Lite project, specify in the *Object Name* entry field an existing ProTool/Lite project. When creating a new ProTool/Lite project, you can enter a new name having a length not exceeding 24 characters at this point.

### Integrating projects

You cannot call projects under the SIMATIC Manager that have been created as stand-alone projects. For these projects to be linked to a STEP 7 project, they have to be integrated. To integrate these projects, choose in ProTool/Lite *File* → *Integrate* from the menu. Give the ProTool/Lite project a different name in the STEP 7 configuration from that in the original project.

### ProTool/Lite Standalone

ProTool/Lite can still be started as a stand-alone program if you call ProTool/Lite setup and choose *Standalone*. If you wish to modify this setting in Setup, ProTool/Lite is not re-installed, only the link to STEP 7 is canceled.

### Example: Creating a ProTool/Lite project

In this example, you will create a ProTool/Lite project, including all the preliminary work for connecting the OP to the S7 PLC.

1. Create a new STEP 7 project called *PROLITE* in the SIMATIC Manager.
2. Select the *PROLITE* project. Then, choose *Insert → Hardware → SIMATIC 300 Station* from the menu. The *SIMATIC 300 Station1* icon appears in the SIMATIC Manager.
3. If, when you are creating the *PROLITE* STEP 7 project, the icon for an MPI network does not appear, choose *Insert → Subnet → MPI Network*.
4. Select the *SIMATIC 300 Station1* icon and choose *Edit → Open Object* from the menu. The *Hardware Configuration* dialog box appears.
5. Open the hardware catalog by choosing *View → Catalog* from the menu.
6. In the hardware catalog, click the + sign preceding *SIMATIC 300* and then the + sign preceding *RACK 300*. Then, select *Mounting Rail* and drag it into the empty, blue bar of the *Hardware Configuration* dialog box. The first line (expansion slot 0) of the configuration table appears; the rail is entered on it.
7. Click on the + sign preceding expansion slot 0 to open the configuration table completely.
8. Click in the hardware catalog on the + sign preceding CPU-300. Select CPU314 and drag it to expansion slot 2 of the configuration table. CPU314 is entered in expansion slot 2, and the line remains selected.
9. Choose *Edit → Object Properties*. The *Properties – CPU 314* dialog box appears.
10. Click the *MPI* button on the *Properties* card. The *Properties – MPI Node* dialog box is opened.
11. Enable the *Networked* list box by clicking it. Select the *MPI Network 1* entry beneath it.
12. Then, close all the dialog boxes by clicking *OK* or by saving. In this way you have created and networked the PLC to the extent required for ProTool/Lite. The STEP 7 symbol table has been created automatically.
13. To open it, click first on the + sign preceding the *PROLITE* project, on the + sign preceding *SIMATIC 300 Station1*, on the + sign preceding *CPU314* and on the + sign preceding *S7 Programm1*. Select *SY* and then choose *Edit → Open Object*. The symbol table is opened.
14. Make the following entries:
    Symbol: `Mixer1`
    Address: `I0.1`
    The `BOOL` data type is entered automatically.
15. Save and then close the symbol table. You can use the *Mixer1* symbol later to configure a variable.
16. Open the ProTool project containing the standard configurations which were supplied to you. Copy object `OP15C 8*40` to your *PROLITE* project.

17. Double-click the `Copy OP15C 8*40` icon. ProTool/Lite is started and the standard configuration for the OP15C is opened.
18. Choose *System* → *PLC* from the menu. The *PLC* dialog box is opened. By default, the *SIMATIC S7-300/400* PLC is entered at this point in the case of STEP 7 integration.
19. Now, first click the *Edit* button and then the *Parameters* button. The *SIMATIC S7 300/400* dialog box appears.
20. Select the entry *MPI Network1* in the *Connect OP to Network* list box. This entry now appears in the *Select Communicating Peer* list box.
21. Click in the *Select Communicating Peer* list box on the + sign preceding the *MPI Network1* entry. The entry *CPU314 (S7 Program1)* appears.
22. Select the *CPU314 (S7 Program1)* entry and close all the dialog boxes dealing with the PLC by clicking *OK* or *Close*. The connection between the OP and the PLC is thus established.
23. Double-click in the editor window on *Variable*. The *Variable* dialog box appears.
24. In the *PLC* selection box, choose `PLC_1`. In the *Symbol* list box, you will now see the *Mixer1* symbol from the STEP 7 symbol table. Double-click this symbol. The following values are applied to the dialog box:
    `Mixer 1` in the *Name* entry field
    `BOOL` in the *Type* list box
    `I` in the *Area* list box
    `0` in the *E* entry field
    `1` in the *Bit* entry field

## 5.3 The Most Important Objects and Their Settings

**Details of object type**

When a particular type of object – for example, messages – is configured, it is not sufficient merely to edit the messages. Other inputs, concerning communication, method of presentation on the OP and printout, have to be made. Table 5-1 lists the most important types of object and the settings required for them.

Table 5-1 Objects Used and the Necessary Settings

| Objects Used | Associated Settings | Menu Item or Dialog Box |
|---|---|---|
| **PLC** | PLC type, protocol<br>Interface data block<br>(SIMATIC S5 only) | *System → PLC*<br>*System → Area Pointers* |
| **Event messages** | Event message area | *System → Area Pointers* |
| | Message display | *System → Parameters → Messages* |
| | Message printout | *Messages → Attributes window*<br>*System → Parameters → Messages* |
| | Message buffer | *System → Parameters → Messages* |
| – Text | Edit text | |
| – Output | Variable | *Messages → Edit/Insert Field* |
| – Symbolic output | Variable and text list | *Messages → Edit/Insert Field* |
| **Alarm messages** | Alarm message area | *System → Area Pointers* |
| | Acknowledgment area | *System → Area Pointers* |
| | Message display | *System → Parameters → Messages* |
| | Message printout | *Messages → Attributes window*<br>*System → Parameters → Messages* |
| | Message buffer | *System → Parameters → Messages* |
| – Text | Edit text | |
| – Output | Variable | *Messages → Edit/Insert Field* |
| – Symbolic output | Variable and text list | *Messages → Edit/Insert Field* |

Table 5-1 Objects Used and the Necessary Settings

| **Objects Used** | **Associated Settings** | **Menu Item or Dialog Box** |
|---|---|---|
| **Screens** | | |
| – Text | Edit text | |
| – Input/Output | Variable | *Screen → Edit/Insert Field* |
| – Symbolic Input/Output | Variable and text list | *Screen → Edit/Insert Field* |
| – Functions | Soft key | Fx button in screen entry |
| | Call screen using | |
| | function keys<br>or | *System → Screen/Keys*<br>*Select Screen* function |
| | soft key<br>or | *Select Screen* function |
| | Scheduler | *Scheduler*<br>*Select Screen* function |
| **Recipes** | Data mailbox | *System → Area Pointers* |
| | Recipe number mailbox | *System → Area Pointers* |
| | Recipe mailbox | *System → Area Pointers* |
| | Successive recipe mailbox | *System → Area Pointers* |
| – Text | Edit text | |
| – Input | Variable | *Recipe → Edit/Insert Field* |
| – Symbolic input | Variable and text list | *Recipe → Edit/Insert Field* |
| | Call recipe using | |
| | function keys<br>or | *System → Screen/Keys*<br>*Select Data Record* function |
| | soft key | *Select Data Record* function |

## 5.4 Editors for Different Object Types

**Editors in ProTool**

A configuration consists of different objects. We distinguish between different types of objects, such as event messages, alarm messages and screens. ProTool/Lite makes a separate editor available for every type of object. There are editors for

- screens,
- event messages,
- alarm messages,
- variables,
- recipes,
- scheduler,
- symbol lists,
- headers and footers.

Figure 5-5 shows the box from which you can choose the editors.

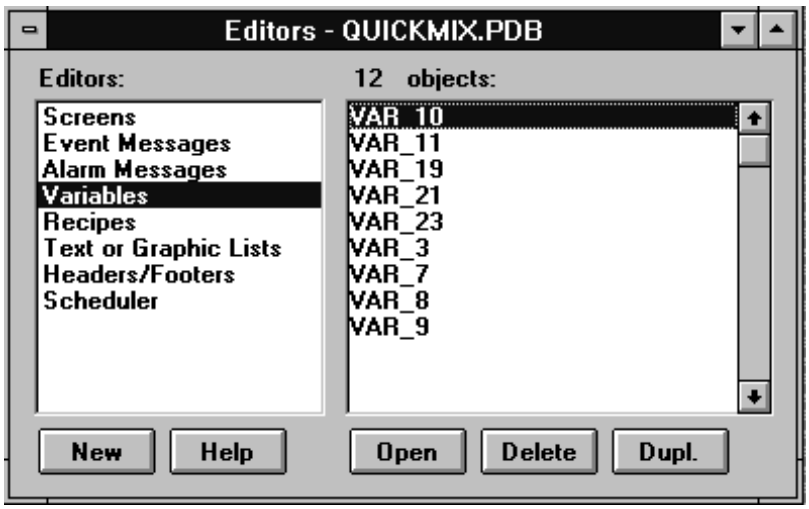



Figure 5-5 The Editors of ProTool/Lite

**Symbolic name**

Objects such as screens, variables and text or graphic lists are saved under a symbolic name. The symbolic name is valid only for that configuration. You have to specify this symbolic name whenever you create, delete and edit objects or reference objects from within other objects. Symbolic object names are displayed under *Objects* in the *Editors* box.

Symbolic object names may have default settings and may be numbered automatically. The default settings may be entered by choosing *Options* → *Default Setting* from the menu. Default settings were performed before ProTool/ Lite was shipped.

### Variables and symbol lists

Variables and symbol lists can also be configured directly for messages and screens. If you wish to configure variables or symbol lists separately, select the corresponding dialog boxes from the editors.

### Object types

The user interface of the different editors is adapted to the specific configuration of the various types of objects. A detailed description will be found else where in this document. A brief summary is presented below.

### Screens

A screen consists of several entries. Soft keys are assigned to every screen entry and can be assigned with different functions for specific entries. Soft keys are arranged directly beneath an entry. This means that the assignment of screen entry and soft key is unambiguous.

Values are always based on variables which define the link to the PLC. The OP reads a value from the PLC and displays it in its configured form. In the case of inputs, a value is sent to the PLC. Fig. 5-6 shows a configured screen with fields and assigned soft keys.

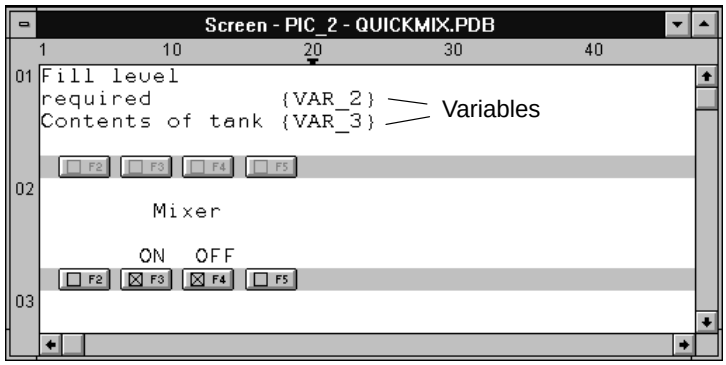



Figure 5-6 Configured Screen in Screen Editor (Example)

### Event and alarm messages

Event messages and alarm messages are used to display operating states and malfunctions in the process. Values, too, can be output in event messages and alarm messages.

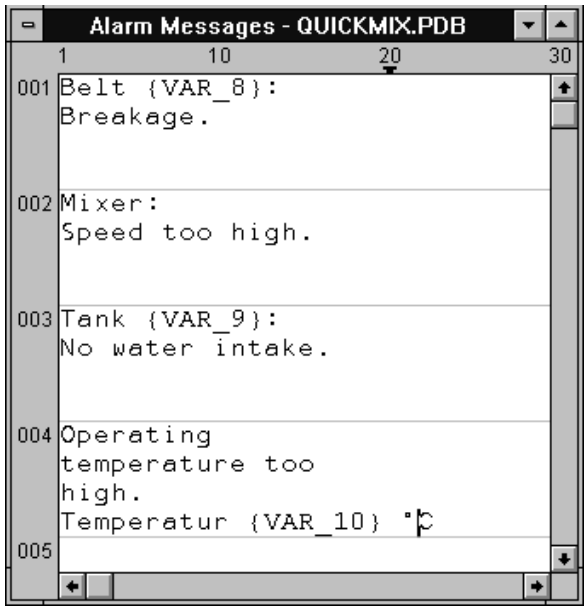



Figure 5-7 Configured Alarm Messages

## Variables

Variables form the link to the PLC. They contain the address in the memory area of the PLC. From these addresses, the OP reads values or it writes values to them.

The *Variable* dialog box is PLC-specific. Depending on the PLC that you set, the appropriate data types and addresses are presented to you. An example of a variable configured for the SIMATIC S5 is shown in figure 5-8.

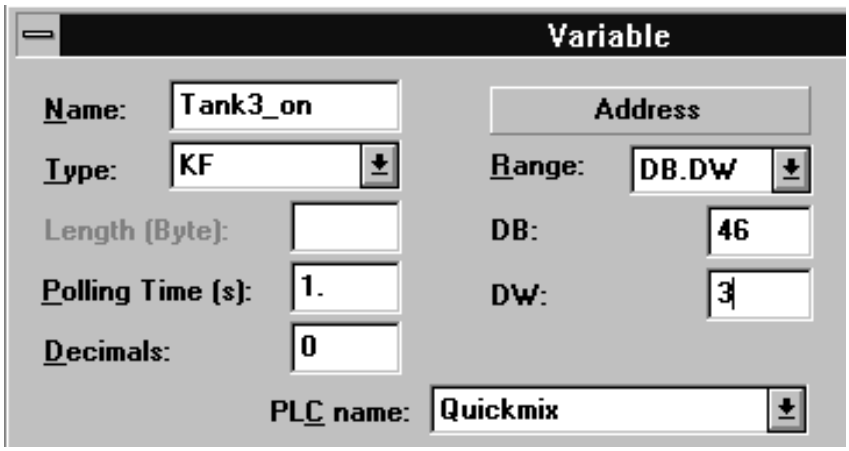



Figure 5-8 Variable Configured for the SIMATIC S5

## Recipes

Recipes are groups of technologically associated PLC setpoints for a specific application. Data are assigned to the configured data structure on the OP. Figure 5-9 shows a configured recipe.

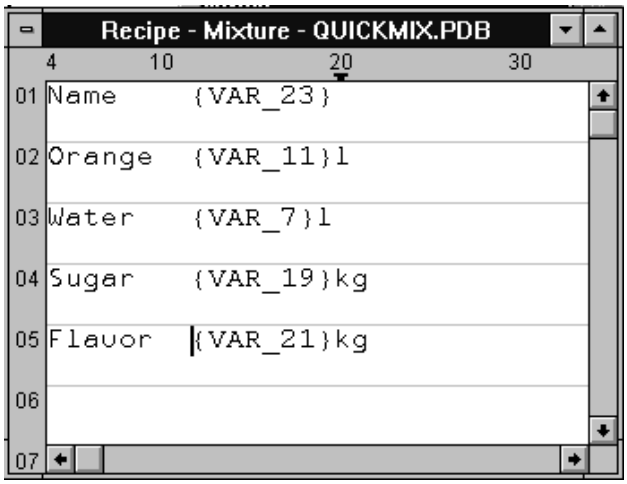



Figure 5-9 Configured Recipe

## Scheduler

A scheduler defines a regularly recurring point in time at which a specific function is required to be executed. The following types of scheduler times are available:

- hourly,
- daily,
- weekly or
- annually.

Table 5-2 shows the time entries that are required for the different types of scheduler.

Table 5-2 Time Entries Required for Different Types of Scheduler

| Scheduler Type | Essential Time Entries |
|---|---|
| Hourly | Minute |
| Daily | Hour, minute |
| Weekly | Day of week, hour, minute |
| Annually | Month, day, hour, minute |

Should you subsequently wish to modify or de-activate the scheduler time, you can insert it in a screen entry. When a scheduler time has elapsed, the corresponding scheduler bit is set on the PLC (in the interface area) and the configured function is executed.

The functions available are:

- Print event buffer
- Print alarm buffer
- Select screen
- Print screen
- Print recipe.

A function does not necessarily have to be configured. If no function is configured, only the scheduler bit is set when the scheduler elapses.

Figure 5-10 shows a configured scheduler time.

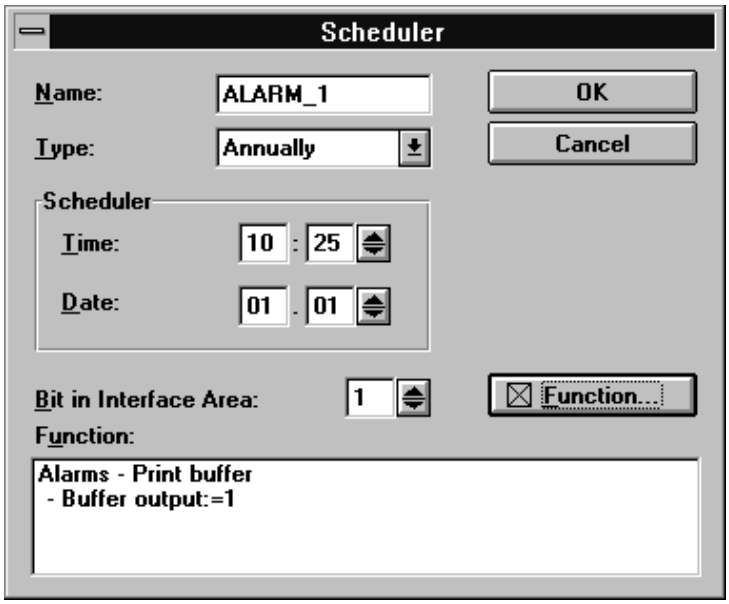


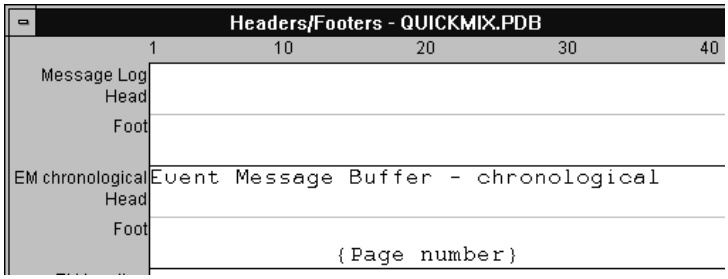

Figure 5-10Configured Scheduler Time

**Symbol lists**

Symbol lists are required for symbolic input/output. In this instance text is assigned to the value of a variable. The text appears on the OP.

**Headers and footers**

Headers and footers can be edited on the OP for printout. Two lines containing 80 characters are available in both cases. You can use both text and fields.




You can initiate different printouts on the OP. These printouts are for:

*Message log*
Every message that arrives, departs or is acknowledged is output to the printer. For this, the *Print* attribute has to be checked for the message.

*EM Chronological*
The event buffer is printed in the chronological order of the messages.

*EM Together*
The event buffer is printed in message number order.

*AM Chronological*
The alarm buffer is printed in the chronological order of the messages.

*AM Together*
The alarm buffer is printed in message number order.

*Overflow*
Messages are deleted automatically when a buffer overflows. Depending on the system setting, such messages are then output to the printer.

*Print screen*
A selected screen is printed.

*Print recipe*
A selected recipe is printed.

## 5.5 Copying to and from the Clipboard

**Scope**

Sections of configurations can be copied to the Clipboard for pasting within an editor or for pasting into other editors. You can even copy from one project to another. This affects message text and screen entry text, as well as soft key assignments. Variables cannot be copied between projects.

**Cutting, copying, pasting**

If you select text in a message, a screen entry or a recipe entry, you can copy, cut and paste it in the same way as with other Windows applications. If you select the whole message or the whole screen entry by clicking the number area, attributes and information text are copied as well.

Selected parts can be moved and copied using drag and drop editing. Move the mouse to the highlighted text and click the left mouse button.

- To move the text, proceed as follows:
  Hold down the mouse button and drag the mouse pointer to the new location.
- To copy text, proceed as follows:
  Hold down the mouse button, press the CTRL key at the same time and drag the mouse pointer to the new location.

Variables may be assigned to fields on screens or in messages. If you copy a field from one configuration to another, the symbolic name of the variable is retained. The values of variables are lost, however.

**Example of copying with variables**

Let us assume that you are copying variable_XX from Configuration_1 to Configuration_2.

- If there still is not a variable with this symbolic name in Configuration_2, variable_XX is created with the default values of Configuration_2.
- If there is a variable with this symbolic name already, then that variable is used.

## 5.6 Assigning Function Keys

**Assigning**

You can assign functions to function keys in your configuration. Click the function key displayed on the screen. The *Function Key - Fx* dialog box is opened. With the *Function* button, select the function call you require for key assignment from the list of functions.

You can assign two types of function key: global and local. Local assignments have priority over global ones.

| | |
|---|---|
| Global | signifies that the assignment applies to the whole configuration. |
| Local | signifies that the assignment applies only to individual screens. Function key assignments may vary from one screen entry to another. In this way you can have functions initiated in keeping with the situation.<br><br>A function key, whose assignment may vary depending on the screen entry, is referred to as a *soft key.* |

Always place functions that must always be at hand on function keys, never on soft keys.

**Soft keys**

Soft keys are the keys that are directly located under the screen entry. You can assign the following keys as soft keys on the different OPs:

| | |
|---|---|
| OP3 | Keys F1 to F5 of the function keyboard. |
| OP5 | Keys F2 to F5 of the function keyboard. |
| OP7 | Keys F1 to F4 and K1 to K4 beneath the display. |
| OP15 | Keys F1 to F8 beneath the display. |
| OP17 | Keys F1 to F8 and K1 to K8 beneath the display. |

You assign soft keys in the editor. You can assign an icon to a soft key that is labeled with text or a graphic.

**Function keys**

Global function keys are assigned only by choosing *System* → *Screen/Keys* from the menu. The following keys can be assigned as function keys for the different operator panels:

| | |
|---|---|
| OP5 | Function keys F1 to F6 . |
| OP7 | Function keys F1 to F4 and K1 to K4. |
| OP15 | Function keys K1 to K16 . |

OP17 Function keys F1 to F8 and K1 to K16.

Function keys may have two assignments:

- for single key operation
- for SHIFT + key operation.

You can note the functions you have assigned to keys on labeling strips.

## DP direct keys

The F and K keys of Operator Panels OP7 and OP17 can be configured as DP direct keys. DP direct keys means that set bits are passed directly (unpacked) over the L2-DP bus to the PLC. The response time in type mode is about < 100 ms. DP direct keys are configured by means of STEP 7.

In order to be able to use the F and K keys as DP direct keys, set CPU type SIMATIC S7-300/400 by choosing *System* → *PLC* → *Edit* from the menu. Select communication type *DP* by choosing *Parameters* and then *Profile*.

---

**Note**

To use the DP direct keys, the OP7 or OP17 must have been configured as an active DP slave in the L2-DP network.

---

You will find details of the assignment of PLC parameters for the connection via L2-DP in the Communication User's Manual.

# Variables

# 6

## Definition

Variables represent the lowest level in a configuration. You specify the address on the PLC in variables. This means that variables are used to establish the link to the PLC. Values are written to variables. This may be done from the PLC or by means of an operator input.

## Usage

Variables are used to display process values. They can be configured on screens and in messages or recipes. To do this, you must insert a field to define how the variable is to be used. The variable itself defines only the address on the PLC. The field defines how the variable is to be used – for input or for output.

## Updating

The setting for transferring the values of variables between the OP and the PLC is as follows:

Polling time > 0 If a value greater than 0 is entered for the polling time of a variable, the value of the variable is transferred within the specified time.

Polling time is a multiple of the standard clock pulse in seconds. By default, the standard clock pulse is set to 200 ms. If, for example, you enter a polling time of 0.8 s, it is four times the value of the standard clock pulse. If you raise the standard clock pulse to 400 ms by choosing *System → PLC* from the menu, the specified polling time is increased to 1.6 s.

By raising the standard clock pulse, you can globally increase the polling times of all the variables in a project.

Polling time = 0 If the polling time is entered as `0`, the variable is read only when a screen, message or recipe is called. It is then not updated after that.

## 6.1 Configuring a Variable

**Setting an address**

To configure a variable, select the *Variables* editor in the Editors dialog box.

In the *Variable* dialog box, enter the address from which the value you wish to display will be read or to which it will be written.

When defining a field, you can use a variable that is already configured on a screen, in a message or in a recipe. However, you can also configure the variable when you define a field (see chapter 7, 8 or 9).

**Setting the PLC**

Apart from the address, you also have to set the PLC. Define the PLC under a symbolic name by choosing *System* → *PLC* from the menu. You specify this name in the *Variable* dialog box. The complete address setting depends on the PLC you are using.

**Example for SIMATIC S5**

To configure a variable, proceed as follows:

1. Select the *Variables* editor in the Editors dialog box. The *Variables* dialog box is opened.

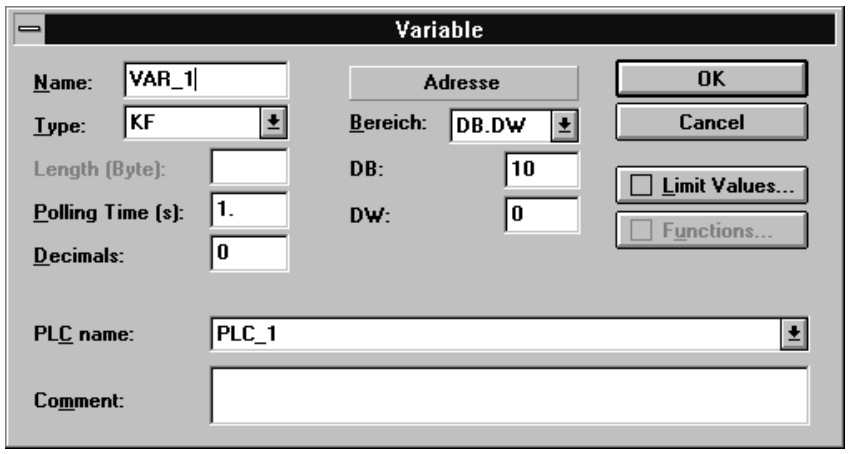



Figure 6-1 Dialog Box

2. The *Name* field displays the symbolic name together with the next free number. If you have still not configured any variables in this project, `Var_1` is displayed in this field.

3. Enter the following values in the *Variable* dialog box:
   *DB:* `10`
   *DW:* `2`
   *Format:* `KF`
   *PLC:* `PLC_1`
4. Exit from the *Variable* dialog box by clicking *OK*.
5. The entry `VAR_1` appears under *Objects* in the right column of the Editors dialog box.

## 6.2 Setting Limit Values of a Variable

### Upper and lower limit values

For every variable, you can configure an upper limit value and a lower limit value. If you enter a value outside the configured limit values, the input is not accepted. Upper and lower limit values are set in the *Limit Values* dialog box. Figure 6-2 shows the dialog box. Configured limit values are possible only in input and input/output fields.

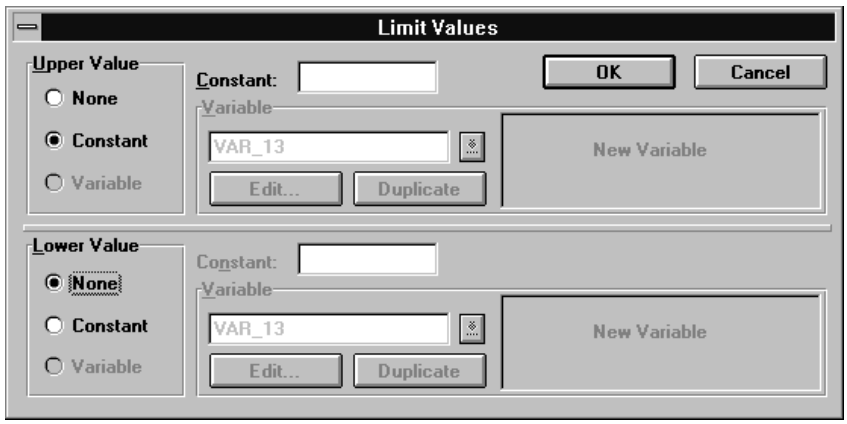



Figure 6-2 *Limit Values Dialog Box*

Under *Upper/Lower Limit Values*, you can choose whether there is to be an upper limit value and/or a lower limit value for the variable that you configured. By default, the setting is disabled. You can define whether the specified limit value is determined by a *constant* or a *variable* (OP3, OP7 and OP17 only). If you specify a limit value variable, it must have the same format as the corresponding variable.

### Interpretation of digits behind the decimal points

Limit values for variables are entered without a decimal point. Depending on whether digits behind the decimal points are specified for the variable, the constant for the limit value is interpreted in different ways. The same number of digits behind the decimal points as specified is taken to be the number of digits behind the decimal points for the limit value as well.

| Configured Digits behind Decimal Points | Limit Value Input | Interpretation by ProTool |
|---|---|---|
| 0 | 2222 | 2222 |
| 1 | 2222 | 222.2 |
| 2 | 2222 | 22.22 |

## 6.3 Using the STEP 7 Symbol Table

**Definition**

In STEP 7, you can assign informative symbolic names, called symbols, for addresses. Symbols are stored together with the data type, address and comments in a symbol table. You can use a symbol contained in the symbol table in ProTool/Lite for configuring a variable.

A symbol contained in the symbol table may also be a structured data block, which you can open by double-clicking.

**Requirements**

The requirements for using the symbol table are as follows:

1. You have installed ProTool/Lite integrated into STEP 7 under Windows95.
2. You have assigned parameters to an S7 PLC connection in ProTool/Lite and selected an S7 CPU at that point (refer to section 5.2). This means that the corresponding STEP 7 symbol table has been set.
3. Symbols have already been created in the STEP 7 symbol table.

**Applying symbols for setting variables**

To apply symbols from the STEP 7 symbol table, open the *Variable* dialog box. The symbols contained in the symbol table are now listed in the *Symbol* box.

The following entries are applied to the dialog box as soon as you select one of the symbols:

- the symbol name, as the name of the variable
- the address and
- the data type.

You can modify the name of the variable later without the link to the symbol table being lost. Modifications to the symbol table in STEP 7 are applied to ProTool/Lite after the STEP 7 symbol table has been saved.

Figure 6-3 shows the *Variable* dialog box with the STEP 7 symbol table.

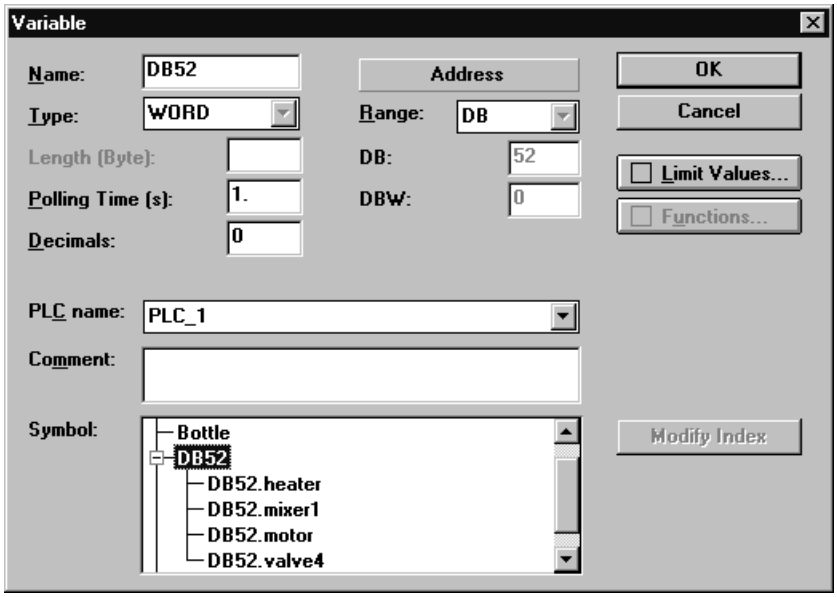



Figure 6-3 *Variable* Dialog Box with Embedded STEP 7 Symbol Table

# Screens

# 7

## Definition

Screens represent a summary of process values for displaying process execution and specifying values for a process. Process values can be randomly sorted according to subject matter. With screens, entered values are immediately transferred to the PLC.

A typical screen might be:

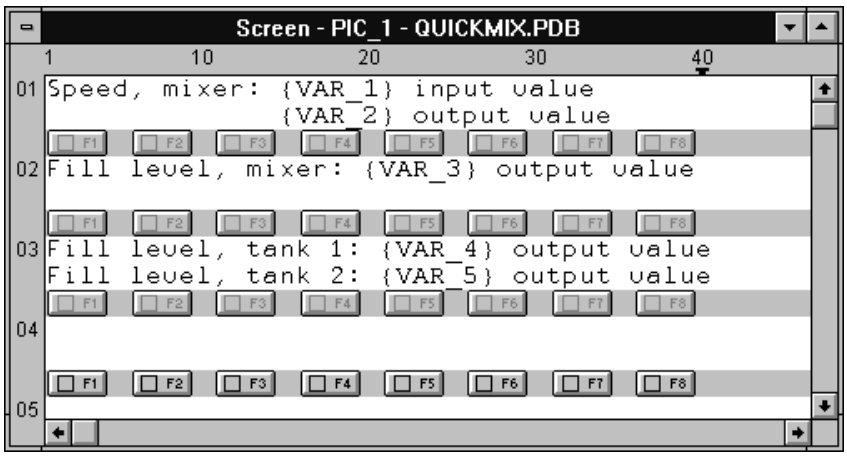



Figure 7-1 Configured Screen in ProTool/Lite

## Screen editor

Screens are created with their own editor. Every screen is stored under a symbolic name. The name is entered by choosing *Screen* → *Attributes* from the menu. You must specify this name whenever you wish to edit, reference or delete the screen. In addition, the screen is automatically given a number which can be modified.

## Components of a screen

You can configure one or more screen entries on a screen. A screen is the same size as the display. The entry numbers are shown in the left margin of the Screens editor (refer to Figure 7-1). The maximum number of screen entries on a screen depends on the OP you are using.

An entry consists of static text and/or fields. Fields may contain variables, the date, time or a scheduler. Text such as variables can be freely configured. The link to the PLC is established by means of variables.

# 7.1 Configuring Fields

**Field types**

When configuring a screen entry, you can use the following field types:

Input fields
With input fields, the operator enters a value on the OP which is transferred to the PLC. The value can also be entered in symbolic form as text.

Output fields
With output fields, values are read from the PLC and displayed on the OP. The value can also be output in symbolic form as text.

Fields for date and time are special fields which are not linked to the PLC. In these fields, the OP date and time is displayed.

Input/output fields
With input/output fields, values are read from the PLC. Simultaneous inputs are possible in this type of field on the OP. Symbolic inputs and outputs are possible here too.

The objects that can be entered in the different field types are shown in Table 7-1.

Table 7-1 Field Types Possible for the Different Objects

| Field Type | Used for | Display |
|---|---|---|
| Output | Variable | Value, symbol |
| | Date | Value |
| | Time | Value |
| Input | Variable | Value, symbol |
| | Scheduler | Value |
| Input/output | Variable | Value, symbol |

## Configuring fields

To configure fields, choose *Screen* → *Edit/Insert Field* from the menu. The *Input/Output* dialog box appears (refer to Figure 7-2).

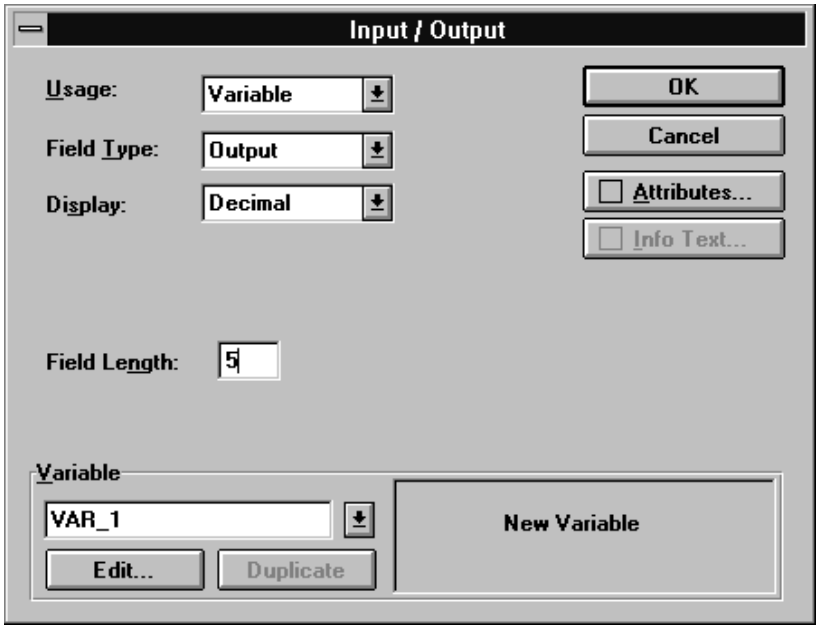



Figure 7-2 Input/Output Dialog Box

In this dialog box, you set how a field is displayed on the OP. To do this, you have to specify the following three items:

| | |
|---|---|
| Usage | Here you set whether a link to the PLC exists by using a variable or the field is used to display the date, time or a scheduler. |
| Field type | Here you set whether a field is an input field, an output field or an input/output field. |
| Display | Here you set how the contents of a field will be displayed – as a value or a symbol. When values are set, you can choose between different formats – for example, decimal, hexadecimal or string. |

## Configuring fields with symbolic display

If you select the entry *Text Symbol* for *Display*, you can assign a symbolic display to a field. In symbolic fields, text is displayed instead of values. Text is assigned to the values of a variable in the configuration.

For example, to switch a motor on and off, the values of the variable are not self-explanatory. Text is easier for the operator to understand. The assignment of values and text might be as follows:

```
0       OFF
1       SLOW
2       FAST
```

The OP does not display a value `0` but the corresponding word – `OFF`.

Symbolic inputs and outputs are entered by means of symbol lists. The dialog box changes in the case of a symbolic field as shown in Figure 7-3.

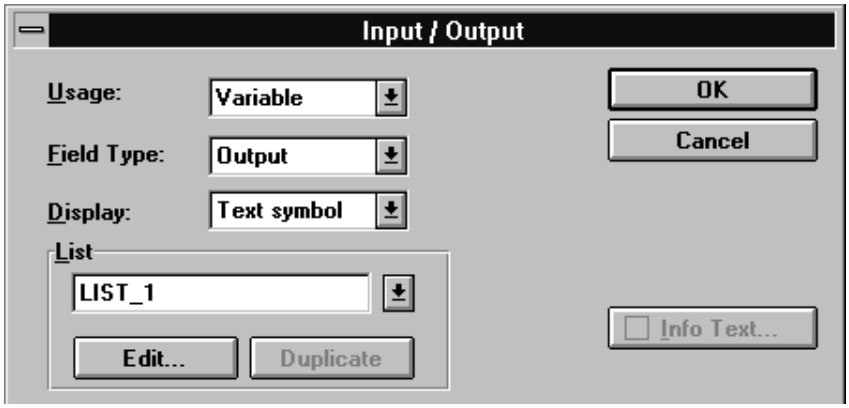



Figure 7-3 Text Symbol Setting for Symbolic Display

## Editing the symbol list

To edit the symbol list, choose *List* and click the *Edit* button. The *Symbol List – Text* dialog box is opened, and you can edit text in the dialog box. Figure 7-4 shows the dialog box in which the previous example was configured.

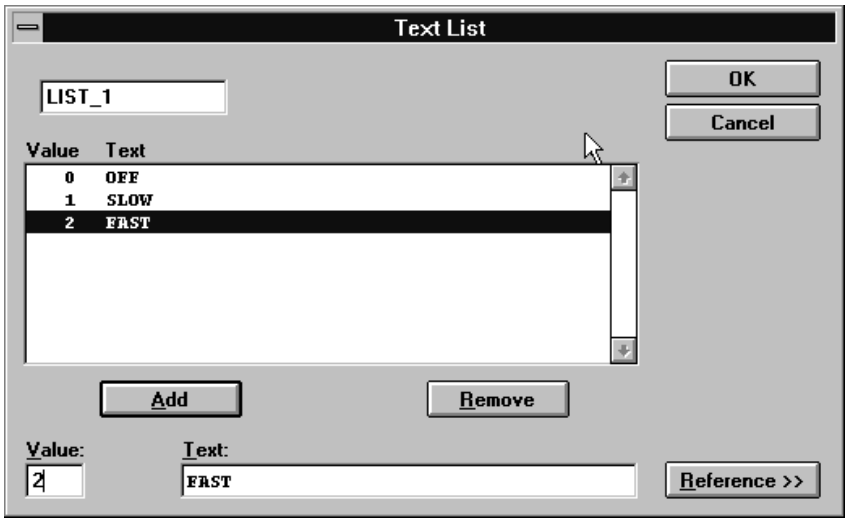



Figure 7-4 Symbol List – Text Dialog Box

## 7.2 Integrating Screen with the Operating Process

**Methods of selecting screens**

For it to be possible to call a screen on the OP, it has to be integrated with the operating process of the OP. There are two ways in which this can be done:

1. You assign the *Select Screen* function to a function key or soft key. Specify the name of the screen that you wish to call as the parameter. In doing so, ensure that the configured function is valid only for the screen entry concerned in the case of soft keys. With function keys, it applies to the whole project.
2. The screen is included in the screen directory. To do this, call *Screen* → *Attributes* on the menu. Check the *Screen to Directory* field. You can now select the screen on the OP under the standard screen *Screens* → *Edit*.

   When you choose the *Title* button, you can give the screen a name, which will then appear in the screen directory.

**Start screen**

One of the screens has to be declared as the start screen. This is the screen which is called when you branch on the OP from message level to screen level. To do this, call *Screen* → *Attributes* on the menu. Check the *Start Screen* field.

## 7.3 Example of Configuring a Screen Entry

**Example for SIMATIC S5**

In this example you will configure a screen having a screen entry. This screen will be the start screen.

1. Call the *Screens* editor.
2. Position the cursor on the first entry.
3. Edit the following text:
   `Speed, mixer:.`
4. To insert an input field, choose *Screen* → *Edit/Insert Field* from the menu. The *Input/Output* dialog box appears.

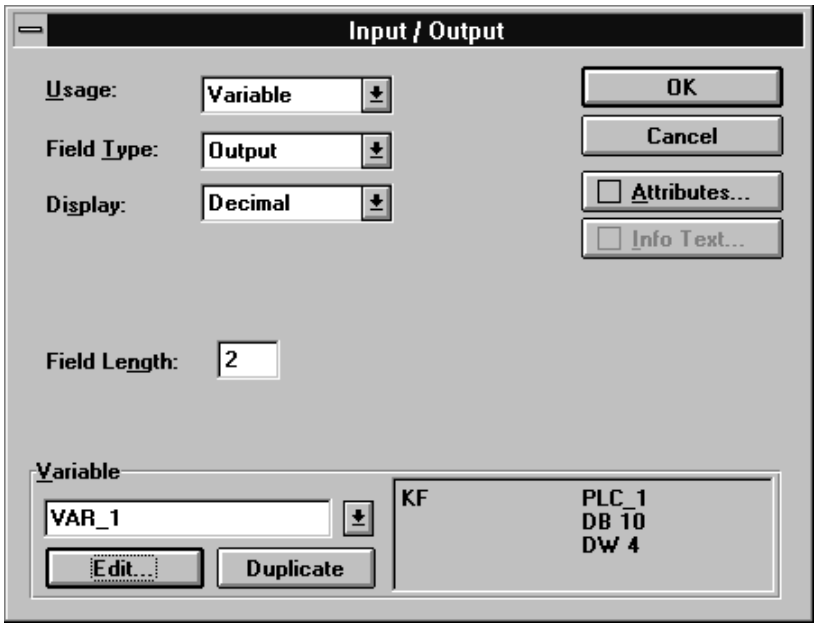



Figure 7-5 Input/Output Dialog Box

5. Under *Usage:*, select ***Variable***.
6. Under *Field Type:*, select ***Input***.
7. Under *Display:*, select ***Decimal***.
8. In the variables field, enter the symbolic name *Var_1*. Click the *Edit* but ton to edit a variable. The *Variable* dialog box appears.

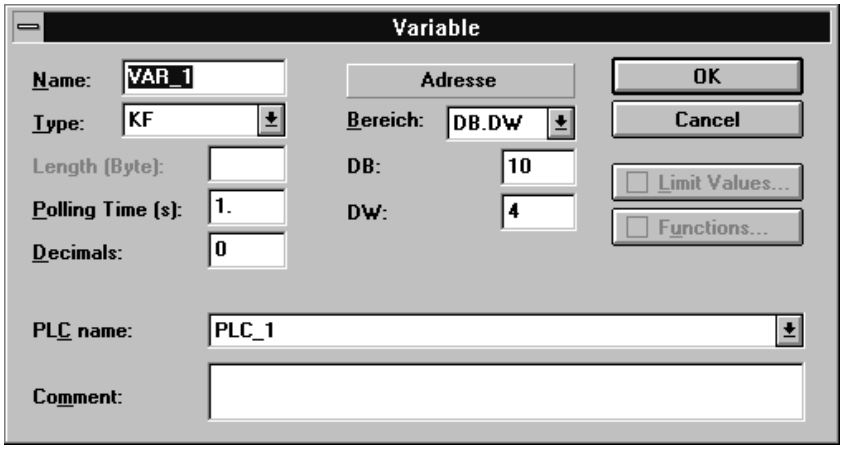
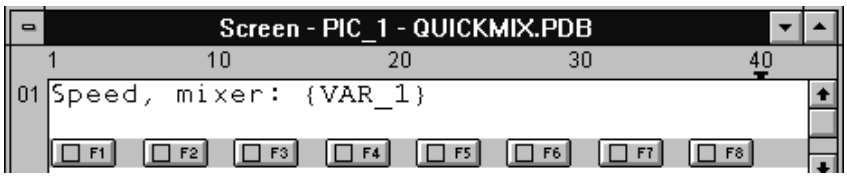
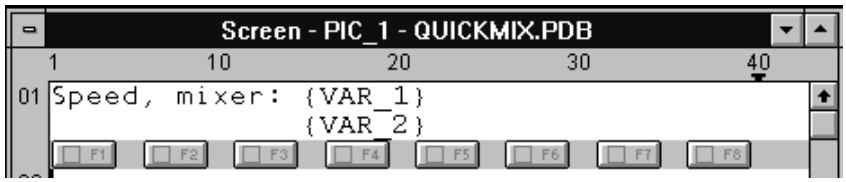



Figure 7-6 *Variable* Dialog Box

9. In the *Variable* dialog box, enter the following values:
   *DB:* 10
   *DW:* 4
   *Format:* KF
   *PLC:* PLC_1
10. Exit from the *Variable* and *Input/Output* dialog boxes by clicking *OK*.
11. The screen entry now looks as follows:




12. Press RETURN and enter blanks until the cursor is located under VAR_1.
13. Now configure the output field. To insert an output field, choose *Screen → Edit/Insert Field* from the menu. The box *Input/Output* dialog box appears.
14. Under *Field Type:*, select ***Output***.
15. Under *Usage:*, select ***Variable***.
16. Under *Display:*, *select* ***Decimal***.
17. Enter the symbolic name *Var_2* in the Variables field. Click the *Edit* button to edit a variable. The *Variable* dialog box appears.
18. Enter the following values in the*Variable* dialog box:
    *DB:* 10
    *DW:* 5
    *Format:* KF
    *PLC:* PLC_1
19. Exit from the *Variable* and *Input/Output* dialog boxes by clicking *OK*.
20. The screen entry now looks as follows:




21. Choose *Screen → Attributes* from the menu. Select the *Start Screen* check box. This makes this screen the start screen.

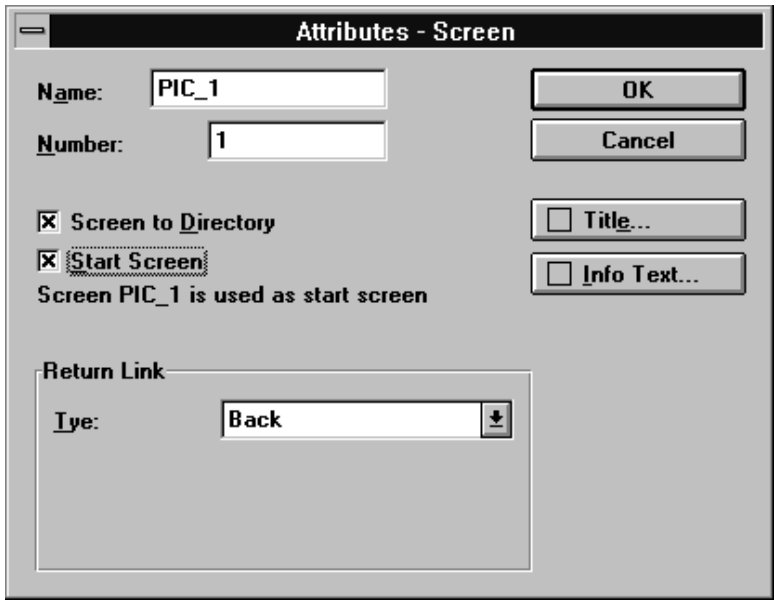



Figure 7-7 *Screen Attributes* Dialog Box

## 7.4 Assigning Soft Keys

**Usage**

You can assign soft keys for each screen entry. That means that you as sign a function to a soft key. Soft keys can be used to call another function, for example, to jump to a screen entry within a screen or to call the message buffer.

**Assigning**

The soft keys are shown directly beneath a screen entry. Next to the func tion key there is a check box. If you have already configured the function key, the check box is checked. Figure 7-8 shows that in entry 2 function key F1 has been configured.

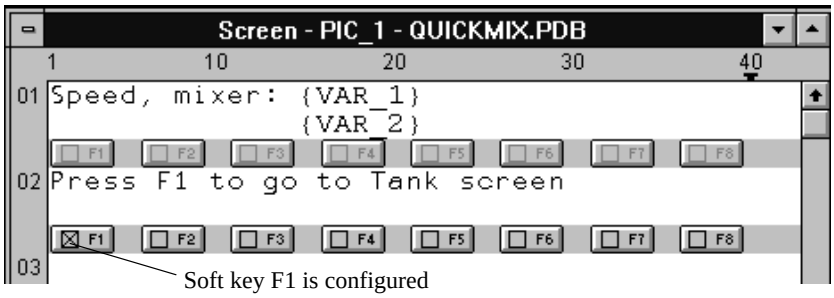



Figure 7-8 Identification of Soft-Key Assignment

To assign a soft key in a screen entry, click one of the F*x* keys beneath the screen entry. The *Function Keys* dialog box appears (refer to 7-9). You can assign a bit in a variable and/or a function to a soft key.

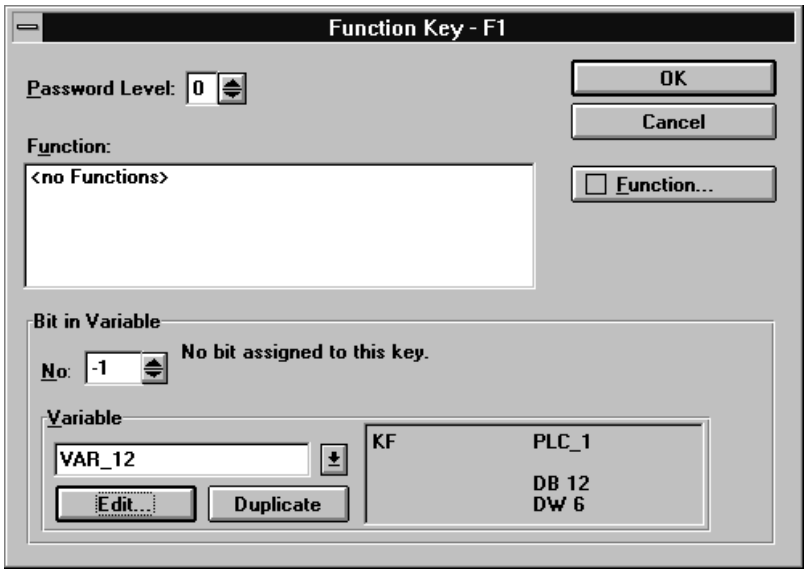



Figure 7-9 Function Keys Dialog Box

### Bit in variable

If you assign a bit to a soft key, the bit is set in the variable when you press the key. The bit is reset by releasing the key. If the address of the variable refers to a data word or a data byte, several keys can be assigned to a variable. These keys can then be pressed simultaneously on the OP.

### Functions

Click the *Function...* button in the *Function key* dialog box. The *Functions* dialog box shown in figure 7-10 appears. In the dialog box, select a function. A brief explanation of the function and its parameters is shown in the *Description* field.

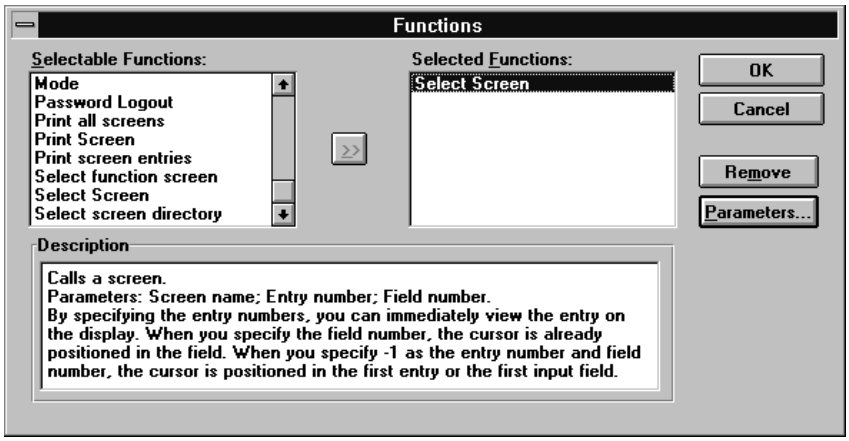

Functions
Selectable Functions:
Mode
Password Logout
Print all screens
Print Screen
Print screen entries
Select function screen
Select Screen
Select screen directory
>>
Selected Functions:
Select Screen
OK
Cancel
Remove
Parameters...
Description
Calls a screen.
Parameters: Screen name; Entry number; Field number.
By specifying the entry numbers, you can immediately view the entry on the display. When you specify the field number, the cursor is already positioned in the field. When you specify -1 as the entry number and field number, the cursor is positioned in the first entry or the first input field.

Figure 7-10 Example of Soft-Key Assignment

By way of an example, select the *Select Screen* function. With the *Select Screen* function you can branch from one screen to another, thus establishing your process-specific screen hierarchy. If you click on the key having the double-headed arrow, the function is transferred to the display field on the right. Click on the *Parameters* button and enter PIC_3, for example, as the parameter. This screen must exist already; if it does not, you cannot select it.

### Description of soft key

If the operator has to be able immediately to recognize which function has been assigned to the soft key, the description of the soft key is shown on the display. There are several ways of doing this, for example.

- In the screen entry, text is arranged immediately above the key – for example, ON, OFF.
- In the screen entry, a line denotes the key to which the lettering refers.
- The description of the soft keys is contained in information text associated with the screen entry.

In any case, make sure that lettering and keys are clearly assigned. Figure 7-11 shows two ways in which you can describe soft keys.

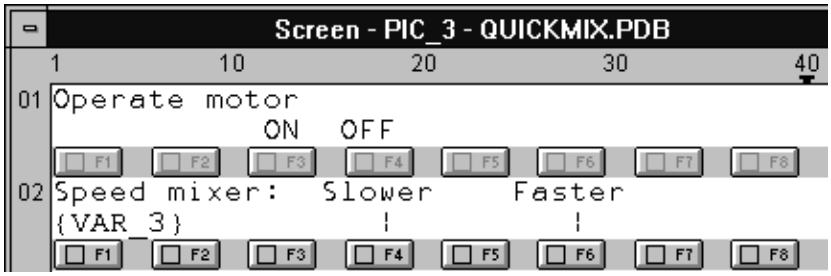



Figure 7-11 Examples of Naming Soft Keys for OP15

On Operator Panels OP7 and OP17 there are two rows of soft keys. You can use the superimposed keys to switch a drive on and off, for instance (Figure 7-12).

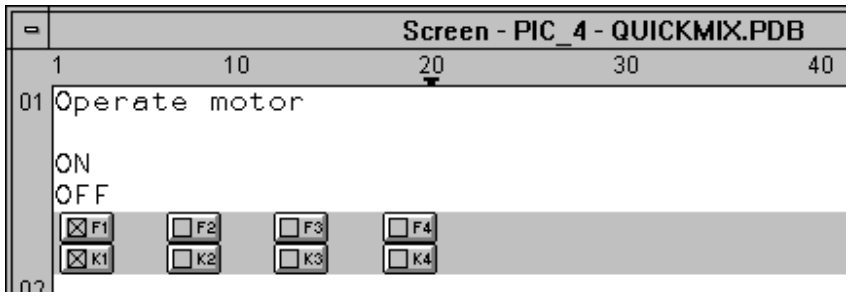



Figure 7-12Examples of Naming Soft Keys for OP7

## 7.5 Using Standard Screens

**Why standard screens?**

When ProTool/Lite is installed, one of the items installed is a configuration with ”standard screens”. You require this configuration if you wish to use standard functions on the OP. The standard screens are listed in Chapter 16.

---

**Note**

If you do not build on top of the standard configuration, you have to configure system function calls yourself.

---

If you wish to use one or more of the standard screens in your configuration, you must proceed from the standard configuration for the OP concerned. Since screens cannot be copied from one screen to another, copy your standard configuration. Use this copy for your work. You copy a configuration by saving it under a different name in ProTool/Lite.

**Standard screen hierarchy**

Standard screens are arranged hierarchically. You branch to all other standard screens from the *Z_SYSTEM_MEN* standard screen. It thus suffices to assign this *Z_SYSTEM_MEN* to a function key. You can then select all other standard screens on the OP.

In the standard configuration supplied to you, the standard screen known as *Z_SYSTEM_MEN* is configured as the start screen. When you edit your process-specific configuration, you will most certainly wish to create your own start screen. If you wish to use the standard screens, you have to integrate them in the configuration first. It is sufficient to call the standard screen known as *Z_SYSTEM_MEN* by means of a soft key or a function key. Select the ”Select Screen” function and specify `Z_System_men` as the parameter.

## 7.6 Detecting a Called Screen on the PLC

**Application**

To be able to detect on the PLC the screen that has just been called on the OP, you have to create a *Screen Number* area on the PLC. The OP stores information in the screen number area about the screen called on the OP.

In this way it is possible to transfer information about the current display contents of the OP to the PLC and to initiate specific reactions on the PLC – for example, calling another screen or selecting an LED.

**Condition**

If you wish to use the screen number area, you have to specify it during configuration as *Area Pointer* – Type *Screen Number.*
It can be created only on one PLC – and once only.

The screen number area is transferred spontaneously to the PLC, i.e. a transfer takes place whenever a change is registered on the OP.

There is therefore no need to configure a polling time.

**Structure**

The screen number area is a data area having a fixed length of five data words. The structure of the screen number area is displayed below.

| | | |
|---|---|---|
| 1st word | Current screen type | Current screen No. |
| 2nd word | Current entry No. | Current input field No. |

| Entry | Assignment |
|---|---|
| Current screen type | 1: Screen<br>2: Recipe<br>3: Function screen |
| Current screen/recipe number | 1 to 99 |
| Current entry number | 1 to 99 |
| Current input field number | 0 to 8 (0: entry field number) |

At message level, at menu level and when a directory is being displayed, all the bytes of the screen number area are assigned with $FF_H$.

With **function screens**, the screen number area is assigned as follows:

| | | |
|---|---|---|
| 1st word | 3 | Function screen No. |
| 2nd word | $FF_H$ | Current input field No. |

# Messages

# 8

## Definition

The user defines which messages are event messages and which are alarm messages. Alarm messages have priority. Event messages and alarm messages are initiated by the PLC. They contain information about events and states in the control process. Alarm messages have to be acknowledged on the OP. After being issued, event messages and alarm messages are stored on the OP in separate message buffers. Stored messages can be displayed on the OP and output to an attached printer.

Event messages have a special feature – event message No. 0 is the standby message.

Typical event messages and alarm messages might look as follows:

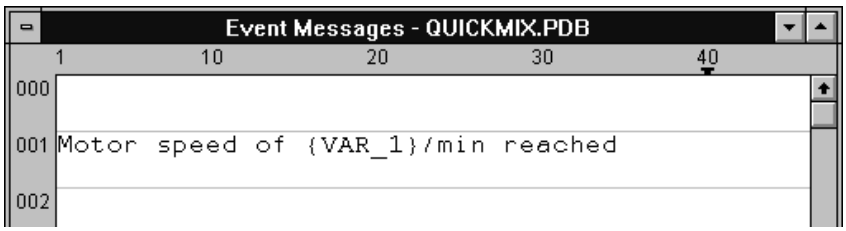



Figure 8-1 Configured Event Message in ProTool/Lite

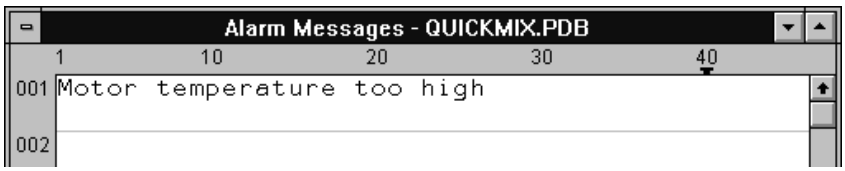



Figure 8-2 Configured Alarm Message in ProTool/Lite

## Message editors

Separate editors are available for creating event messages and alarm messages. You can set the priority of a message or whether it should be acknowledged or whether it should be printed in a separate *Attributes* dialog box.

## Components of a message

A message consists of static text and/or variables. Text and variables can be freely configured. Variables are used for the link to the PLC. Before you can use variables in a message, you must first insert a field. Only output fields can be used in messages.

## Message area

For event messages, an event message area must be defined in the configuration, as must also an alarm message area for alarm messages. You set the message area by choosing *System → Area Pointers* from the menu.

An event message or an alarm message can be configured for every bit in the configured message area. When you create the address area for the message area, the number of messages that can be created for it is displayed.

Every message area can be divided into several address areas. Table 8-1 shows the number of message areas for event messages and alarm messages, the number of alarm message acknowledgment areas as well as the total length of all the areas for the different OPs.

Table 8-1 OP Message Areas

| **Device** | **Event Message Area** | | **Alarm Message Area and Alarm Message Acknowledgment Area** | |
|---|---|---|---|---|
| | **Number** | **Length** (Words) | **Total per Type** | **Overall Length per Type**(Words) |
| OP3 | 4 | 32 | – | – |
| OP5 | 4 | 63 | 4 | 63 |
| OP7 | 4 | 63 | 4 | 63 |
| OP15 | 4 | 63 | 4 | 63 |
| OP17 | 4 | 63 | 4 | 63 |
| C7-623 | 4 | 63 | 4 | 63 |
| C7-624 | 4 | 63 | 4 | 63 |

## Message numbers

In the message editor, message numbers are listed in the left margin. A bit number is assigned to every message number. Thus you can see immediately the bit in the event or alarm message area to which a configured message belongs. In addition, the address with which the message is associated is displayed on the status bar.

## Assigning message numbers in data words

**Example for SIMATIC S5:**
The association of the event message area and message numbers is shown in the following with reference to an example. Let us assume that the following event message area has been configured for the SIMATIC S5 PLC:

`DB 60  Address 43  Length 5` (in DW)

Figure 8-3 shows the association of bit numbers and message numbers for data words. Message numbers and bit numbers are associated automatically on the OP.

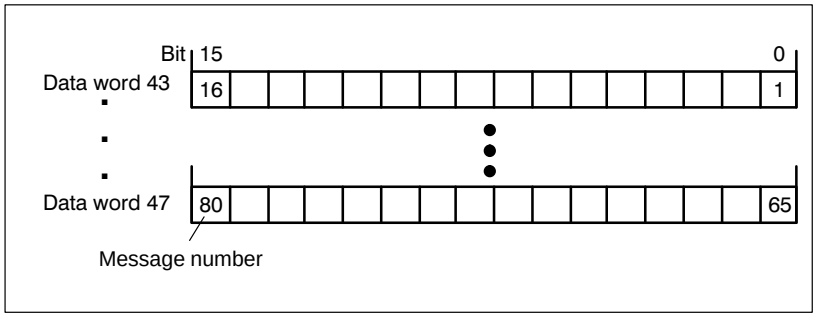



Figure 8-3 SIMATIC S5:
Association of Bit Numbers and Message Numbers for Data Words

**Example for the SIMATIC 500/505**:
Let us assume that the following event message area has been configured for the SIMATIC 500/505 PLC:

`V 43  Length 5` (in words)

Figure 8-4 shows the assignment of all the 80 (5 x 16) message numbers to the individual bit numbers in the event message area of the PLC.

This assignment is performed automatically on the OP.

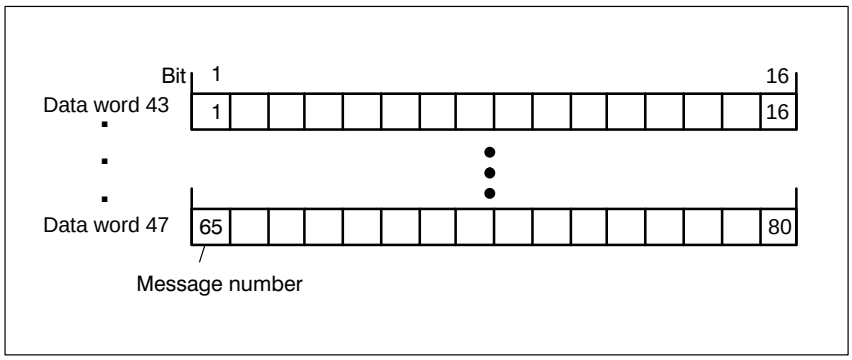


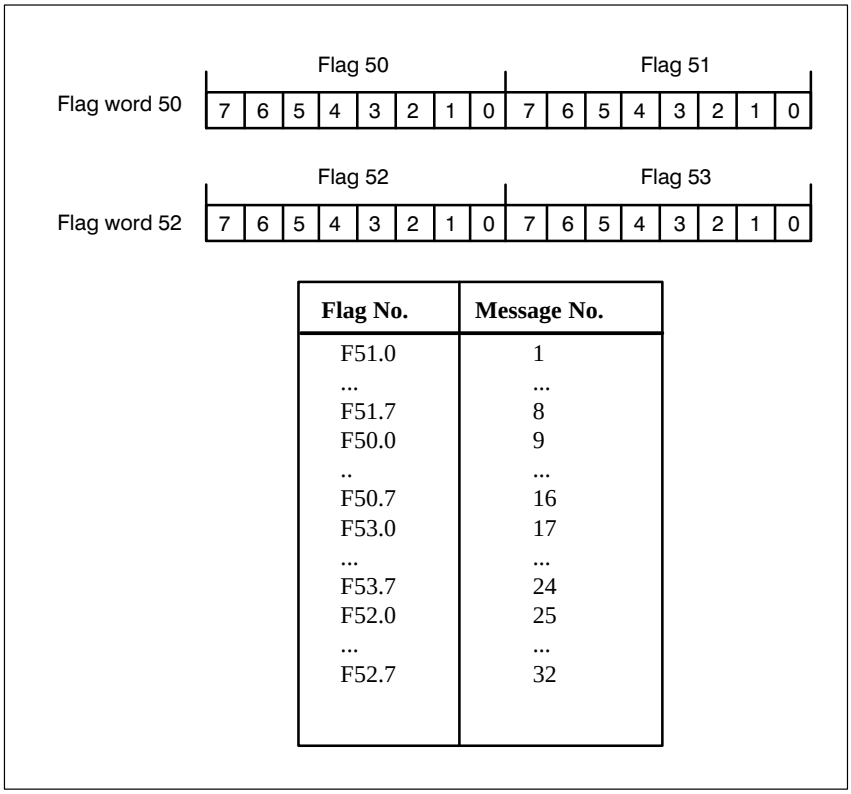

Figure 8-4 SIMATIC S500/505:
Association of Bit Numbers and Message Numbers for Data Words

## Assigning message numbers in flag words

**Example for SIMATIC S5:**
The event message area can also be set in flag words. In the following example, the event message area set is:

`MW 50  Length 2` (in FW)

Figure 8-5 shows the association of message numbers and bit numbers for flag words.




| Flag No. | Message No. |
|---|---|
| F51.0 | 1 |
| ... | ... |
| F51.7 | 8 |
| F50.0 | 9 |
| .. | ... |
| F50.7 | 16 |
| F53.0 | 17 |
| ... | ... |
| F53.7 | 24 |
| F52.0 | 25 |
| ... | ... |
| F52.7 | 32 |

Figure 8-5 SIMATIC S5:
Association of Bit Numbers and Message Numbers for Flag Words

### Printout

So that you can print messages on your printer, you have to check in your configuration the *Print* attribute in the *Attribute Window* of the message editor for every message you want to have printed. By choosing *System* → *Parameters* → *Messages* from the menu, you can perform the following set tings for printing messages:

- *Messages*: The printing of all events is enabled.
- *Off*: Message printing is disabled.
- *Overflow*: When a message buffer is full, the OP deletes messages before new ones are entered. If the *Overflow* field is checked, all the messages are printed prior to deletion. This is done irrespective of whether the *Print* attribute has been set.

### Overflow warning

If you choose *System* → *Parameters* → *Messages* from the menu and check the Overflow Warning field, a warning is issued on the OP as soon as the configured remaining space of the message buffer is reached or the space is less than that configured. You can set the remaining buffer size.

# 8.1 Configuring Output Fields

**Output fields**

With output fields, values are read from the PLC and displayed on the OP. The value can also be output in symbolic form as text.

Output fields for the date and time are special fields that are not linked to the PLC. These fields display the date or time of the OP.

The entries that can be performed for messages in output fields are shown in Table 8-2.

Table 8-2 Possible Contents of Output Fields in Messages

| Field Type | Used for | Display |
|---|---|---|
| Output | Variable | Value, symbol |
| | Date | Value |
| | Time | Value |

**Configuring output fields**

To configure output fields, select *Messages* → *Edit/Insert Field* from the menu. The *Output* (Figure 8-6) dialog box appears.

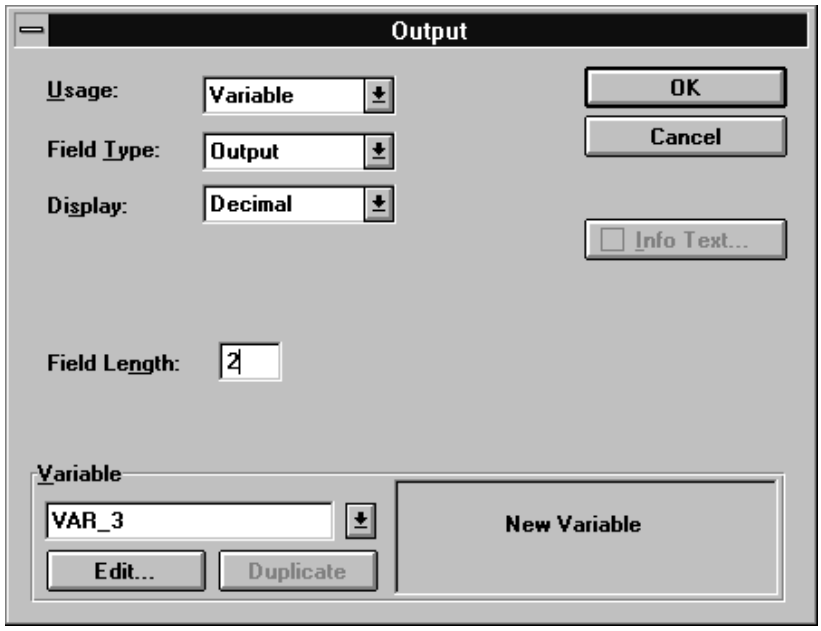



Figure 8-6 Ouput Dialog Box

In this dialog box, you set how a field will be displayed on the OP. To do this, you must specify the following three items:

| | |
|---|---|
| Usage | Here you set whether a link to the PLC exists by using a variable or the field is used to display the date or time. |
| Field type | At this point the only field type you can select is *Output*. |
| Display | Here you set how the contents of a field will be displayed – as a value or a symbol. When values are set, you can choose between different formats – for example, decimal, hexadecimal or string. |

### Configuring fields with symbolic display

If you select the *Text Symbol* entry for *Display*, you can assign a symbolic display to a field. In symbolic fields, text is displayed instead of values. Text is assigned to the values of a variable in the configuration.

To display the operating state, for example, of a motor in normal operating mode or in the case of a malfunction, the values of the variables are not sufficiently self-explanatory. Text is easier for the operator to understand. The assignment of values and text might be as follows:

| | **Event message** | **Alarm message** |
|---|---|---|
| 0 | OFF | SWITCHED OFF |
| 1 | SLOW | TOO HIGH |
| 2 | FAST | TOO LOW |

The OP does not display a value `0` but the corresponding word – `OFF` or `SWITCHED OFF`.

Symbolic inputs are entered by means of symbol lists. The dialog box is modified as shown in Figure 8-7.

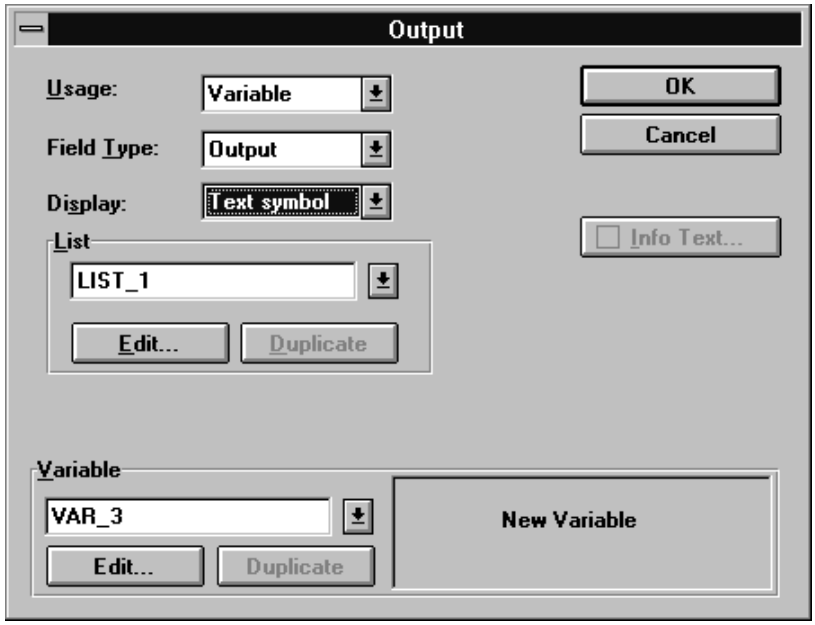



Figure 8-7 Text Symbol Setting for Symbolic Display

**Editing the symbol list**

To edit the symbol list, choose *List* and click the *Edit* button. The *Symbol List – Text* dialog box is then opened, and you can edit text in the dialog box. Figure 8-8 shows the dialog box in which the previous example was configured.

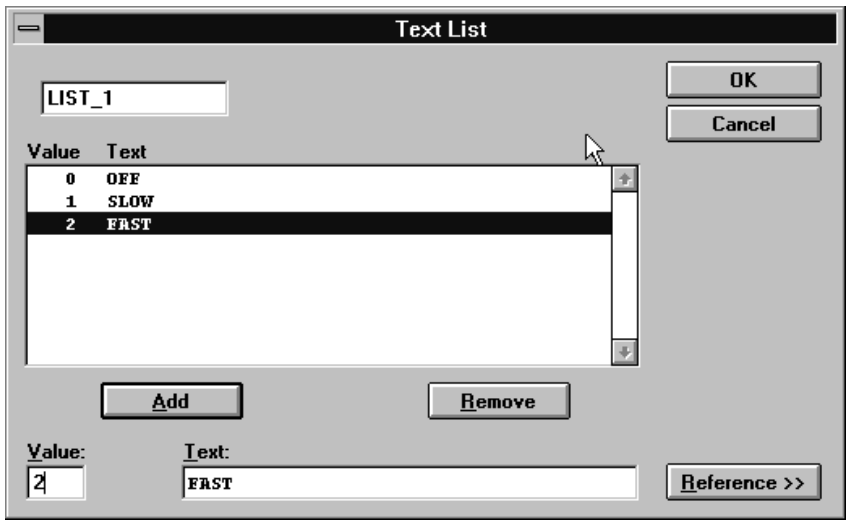



Figure 8-8 Symbol List – Text Dialog Box

## 8.2 Event Messages

**Definition**

With event messages, the status of a bit in the PLC is evaluated by the OP. If the bit is set in the PLC, an event message is initiated on the OP. The configurer defines the bits that will initiate an event message.

**Usage**

Event messages display a status such as

- `Motor switched on`
- `Motor off`
- `Motor speed of xx/min reached`
- `PLC to manual mode`
- `Operating temperature of  xx reached`

**Standby message**

If a standby message having the number 0 is configured, it is interpreted to be the standby message. The standby message is displayed whenever the message level has been selected on the OP and neither an event message or an alarm message is waiting.

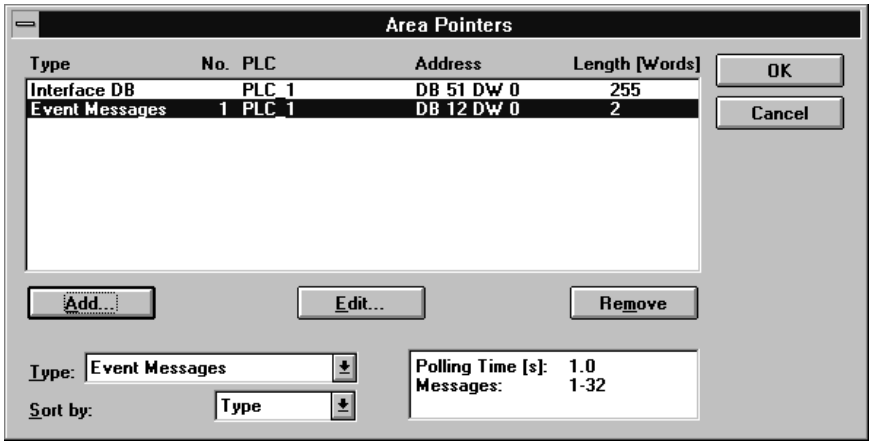
The standby message is similarly displayed after an OP starts up. In the case of the OP7 and OP17, it is displayed only when a start screen has not been defined in the configuration.

The standby message may consist of text and/or fields. You can use just field for date and time in the standby message.

**Example for SIMATIC S5**

In this example you will first configure the event message area, followed by an event message with a field.

1. Choose *System* → *Area Pointers* from the menu to create the event message area.
2. In the *Type* field, select the area pointer for *Event Messages*. Press the *Add* key. The dialog box called *Event Messages* appears.
3. Enter the following values in the *Event Messages* dialog box: *DB:* **`12`**, *DW:* **`0`**, *Length:* **`2`**. You have then created an event message area for 32 event messages.




4. Exit from the *Event Messages* dialog box by clicking *OK* to apply the settings. Exit from the *Area Pointers* dialog box, similarly by clicking *OK*.
5. Call the *event message* editor.
6. Position the cursor at message No. 1.
7. Edit the following message:
   `Motor speed of {Var_3}/min reached`,
   where `{Var_3}` is an output field.
8. To insert the output field, choose *Screen* → *Edit/Insert Field* from the menu. The *Output* dialog box appears.

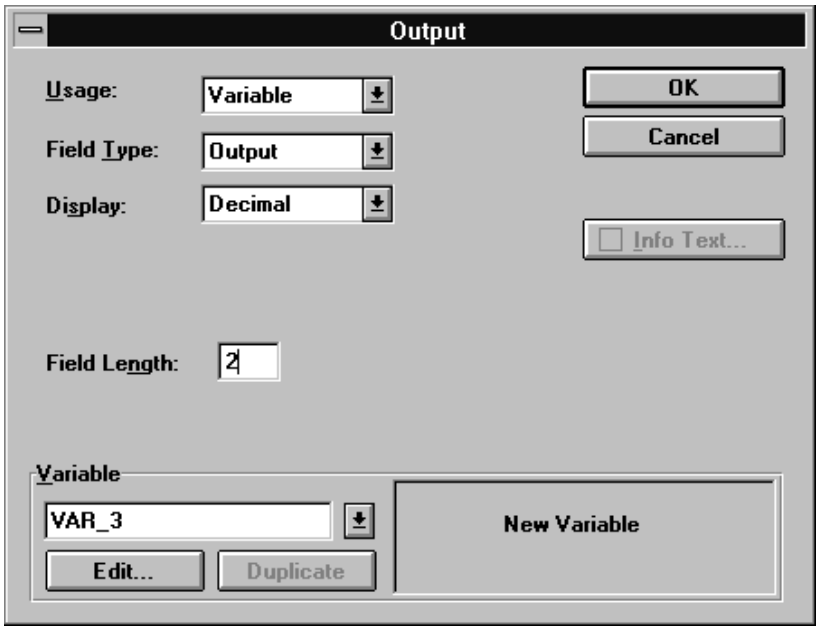



Figure 8-9 *Output* Dialog Box

9. Under *Usage:*, select ***Variable***.
10. Under *Field Type:*, select ***Output***.
11. Under *Display:*, select ***Decimal***.
12. Enter the symbolic name *Var_3* in the Variables field. Click the *Edit* but ton to edit a variable. The *Variable* dialog box is displayed.

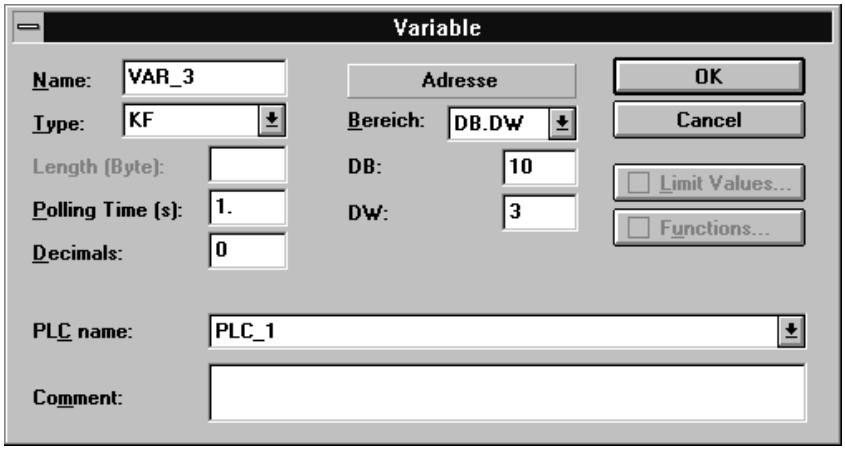
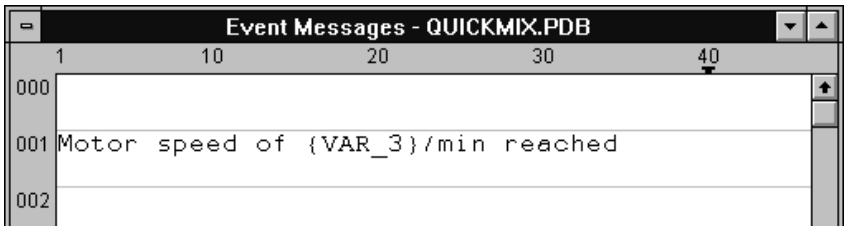



Figure 8-10*Variable* Dialog Box

13. Enter the following values in the *Variable* dialog box:
    *DB:* `10`
    *DW:* `3`
    *Format:* `KF`
    *PLC:* `PLC_1`
14. Exit from the *Variable* and *Output* dialog boxes by clicking *OK*.
15. The following screen shows the edited event message.



## 8.3 Alarm Messages

**Definition**

With alarm messages, the status of a bit in the PLC is evaluated by the OP. If the bit is set in the PLC, an alarm message is initiated on the OP. The configurer defines the bits which initiate an alarm message.

**Usage**

Alarm messages display an operating fault such as

- `Motor temperature too high`
- `Coolant empty`
- `Valve will not open`
- `Fault, compressor 4`
- `Switch M208 open`

**Acknowledging**

Since alarm messages are used to display extraordinary operating states, they have to be acknowledged. Alarm messages are acknowledged either by means of an operator input on the OP or on the PLC.

The association of bit numbers and message numbers is exactly the same as for event messages.

**Acknowledgment area**

If the PLC is to be notified when an alarm message has been acknowledged or when the PLC is required to acknowledge the alarm messages, you have to create suitable acknowledgment areas by choosing *System → Area Pointers* from the menu. The association of alarm messages and bit numbers in the acknowledgment area is the same as for the alarm message area.

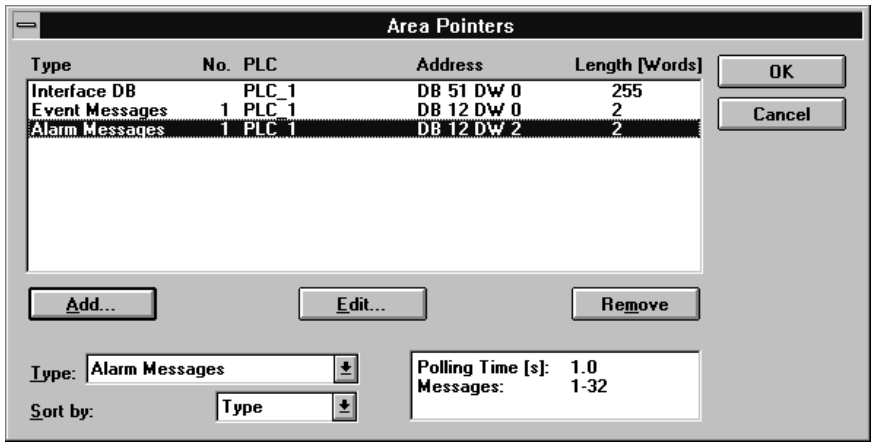
**Message numbers**

In the alarm message editor, message numbers are listed in the left margin. A bit number is assigned to every message number. This means that you can immediately see the bit in the alarm message area with which the configured message is associated. In addition, the address with which the message is associated is displayed on the status bar.

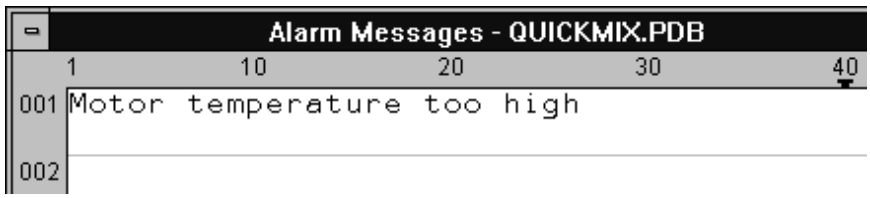
**Example for SIMATIC S5**

In this example you will first configure the alarm message area, followed by an alarm message.

1. Choose *System* → *Area Pointers* from the menu to create the alarm message area.
2. In the *Type* field, select the area pointer for *Alarm Messages*. Press the *Add* key. The dialog box called *Alarm Messages* appears.
3. Enter the following values in the *Alarm Messages* dialog box:
   *DB:* **12**, *DW:* **2**, *Length:* **2**. You have then created an alarm message area for 32 alarm messages.




4. Exit from the *Alarm Messages* dialog box by clicking *OK* to apply the settings. Exit from the *Area Pointer* dialog box, similarly by clicking *OK*.
5. Call the *alarm message* editor.
6. Position the cursor at message No. 1.
7. Edit the following message:
   `Motor temperature too high`.
8. The following illustration shows the edited alarm message.



## 8.4 Options for Displaying Messages

**Settings for message display**

Choose *System* → *Parameters* → *Messages* from the menu. Figure 8-11 shows the dialog box that is now opened. Here you will find one setting for event messages and alarm messages and one setting for alarm messages.

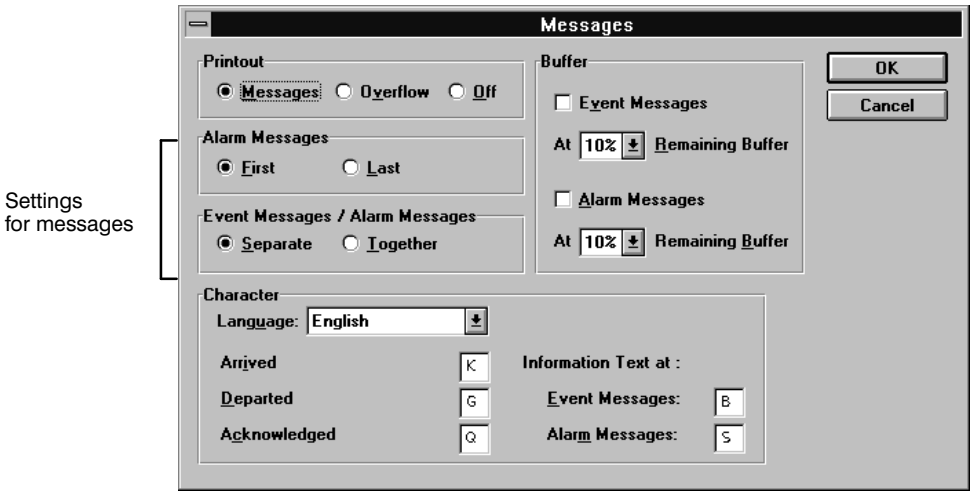



Figure 8-11 System → Parameters → Messages Dialog Box

**Setting event messages and alarm messages**

In your configuration, you can set whether you wish to display event messages and alarm messages together or separately.

Separate

Only one type of message is displayed at a time. Messages are shown according to their priority. The order of priority is

1. Unacknowledged alarm messages
2. Event messages that have not yet departed
3. Alarm messages which have been acknowledged but have not yet departed

Together

The display is divided into areas for event messages and alarm messages. Alarm messages and event messages are displayed simultaneously. Alarm messages have the following priorities:

1. Unacknowledged alarm messages
2. Alarm messages which have been acknowledged but have not yet departed

**Setting alarm messages**

With this setting you set whether the last or first alarm message to be received is displayed. This setting is important in cases where several alarm messages are waiting.

# Recipes

# 9

## Definition

Recipes are groups of variables for a specific application. The purpose of recipes is to transfer several items of data en bloc to the PLC. In addition, the OP and the PLC are synchronized.

In the configuration, the recipe defines the data structure. Data are assigned to the structure on the OP. Since the data structure can be assigned several times, we now speak of data records. Data records are stored on the OP, thus saving storage space on the PLC.

## Example of a recipe

A practical example of a recipe is the bottling machine of a fruit juice system. Let us assume that orange nectar, an orange juice drink and orange juice all have to be produced on the same bottling machine. The ratios of mixture differ from drink to drink, but the ingredients are the same. To accomplish this, the *Mixture* recipe, containing the following data structure, is created:

```
Name        {Var_23}
Orange      {Var_11} l
Water       {Var_7} l
Sugar       {Var_19} kg
Flavor      {Var_21} g
```

The data records now contain the values for the different drinks. The data records might look as follows:

| Orange Drink | | Orange Nectar | | Orange Juice | |
|---|---|---|---|---|---|
| Name | **Drink** | Name | **Nectar** | Name | **Juice** |
| Orange | **90** l | Orange | **70** l | Orange | **95** l |
| Water | **10** l | Water | **30** l | Water | **5** l |
| Sugar | **1.5** kg | Sugar | **1.5** kg | Sugar | **0.5** kg |
| Flavor | **200** g | Flavor | **400** g | Flavor | **100** g |

## Recipe editor

A special editor is available for creating recipes. Every recipe is stored under a symbolic name. You can enter a name by choosing *Recipe → Attributes* from the menu. You specify this name whenever you edit, reference or delete the recipe.

Recipes are also numbered; you can modify recipe numbers.

## Ingredients of a recipe

You can configure entries in a recipe. An entry consists of text and an input field. Figure 9-1 shows the editor used to create recipes.

Figure 9-1 Editor for Creating Recipes

Data records are created on the OP by the operator entering them or by the PLC reading them.

With recipes, an entry does not have the same size as the display. Table 9-1 shows the number of lines available for displaying data records on the OP.

Table 9-1 Display Capacity on OP

| Operator Panel | Lines | Chars per Line |
|---|---|---|
| OP5 | 2 | 20 |
| OP7 | 2 | 20 |
| OP15A | 1 | 40 |
| OP15C | 2 | 20 |
| | 2 | 40 |
| OP17 | 2 | 20 |
| | 2 | 40 |
| C7-623 | 2 | 20 |
| C7-624 | 2 | 20 |

Variables used in recipes may also occur in other objects such as screens. This presupposes that the corresponding fields have the same display format. The following example shows one such application.

## Description of example

Let us assume that for each of the ingredients – orange, water etc. – there are separate screens containing screen entries for the fill level of the storage tank, for the status display of the valves, for display of the quantity consumed and for other details. The screens contain input fields for setting the intake amounts to the mixer. The ratios of mixture can thus be entered screen by screen, and then the mixer can be started. This process has to be repeated for every fruit juice. This process is beneficial when, for example, the system is undergoing commissioning.

## Identical variables on screens and Recipes

If the variables of input fields are combined to form a recipe, completed mixtures for the different fruit juices can be stored by creating data records on the OP. Figure 9-2 illustrates how variables are used on screens and in a recipe.

If you now wish to produce a specific fruit juice, the corresponding data record is transferred to the PLC. This means that the requisite values are assigned to all of the variables.

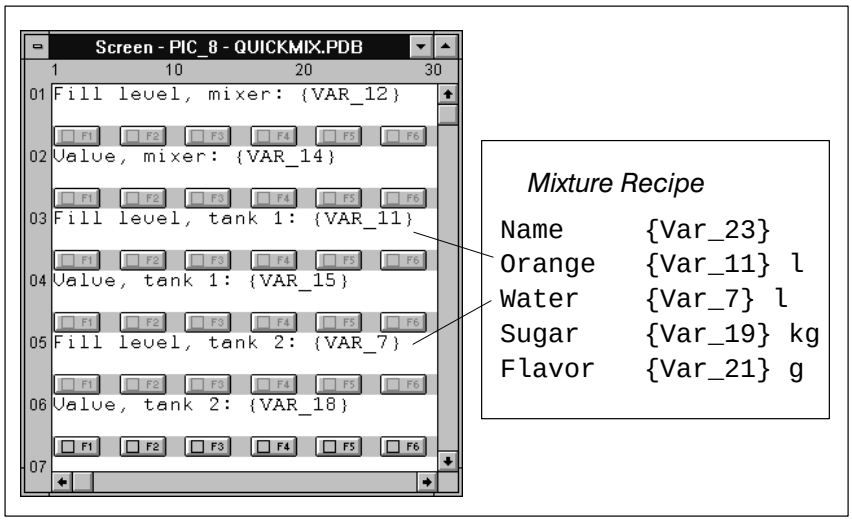



Figure 9-2 Identical Variables in Screen Entries and a Recipe

# 9.1 Configuring Input Fields

### Input fields

With input fields, the operator enters a value on the OP, and the value is transferred to the PLC. The value may also be entered symbolically as text.

Table 9-2 shows you the entries you can make in recipe input fields.

Table 9-2 Entries Possible in Input Fields of Recipes

| Field Type | Usage | Display |
|---|---|---|
| Input | Variable | Value, symbol |

### Configuring input fields

To configure input fields, choose *Recipe* → *Edit/Insert Field* from the menu. The *Input* dialog box (refer to Figure 9-3) appears.

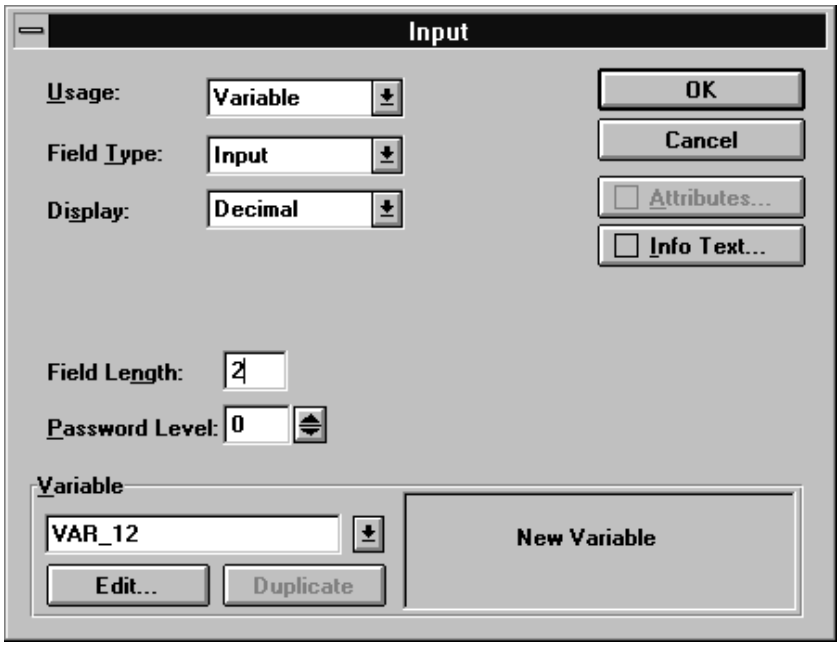



Figure 9-3 *Input* Dialog Box

In this dialog box, you set the way in which an input field will be displayed on the OP. Three items of information are required for this:

| | |
|---|---|
| Usage | You can only select *Variable* at this point. |
| Field Type | The only field type that you can select at this point is ”Input”. |
| Display | At this point you set how the contents of the field are to be displayed, i.e., as a value or as a symbol. In the case of *values*, you can choose from different formats, such as Decimal, Hexadecimal or String. |

### Configuring fields with symbolic display

If you select the *Text Symbol* entry for *Display*, you can assign a symbolic display to a field. With symbolic fields, text is displayed instead of a symbolic value. Text is assigned to the values of a variable in the configuration.

With recipes, the symbolic display can be used to assign a name to the values of variables – for example,

```
0          Drink
1          Nectar
2          Juice
```

The corresponding word `Juice`, not the value `0`, is displayed on the OP.

Symbolic inputs are entered by means of text or graphic lists. The dialog box is modified as shown in Figure 9-4.

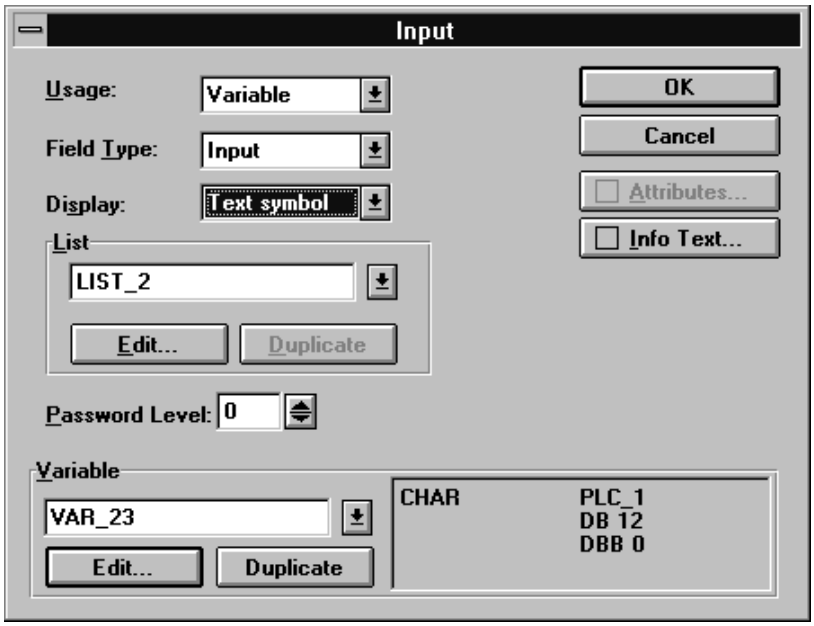



Figure 9-4 Text Symbol Setting for Symbolic Display

### Editing a text or graphic list

To edit the text or graphic list, click under *List* on the *Edit* button. The *Text or Graphic List - Text* dialog box, in which you can edit text, appears. Figure 9-5 shows the dialog box in which the aforementioned example is configured.

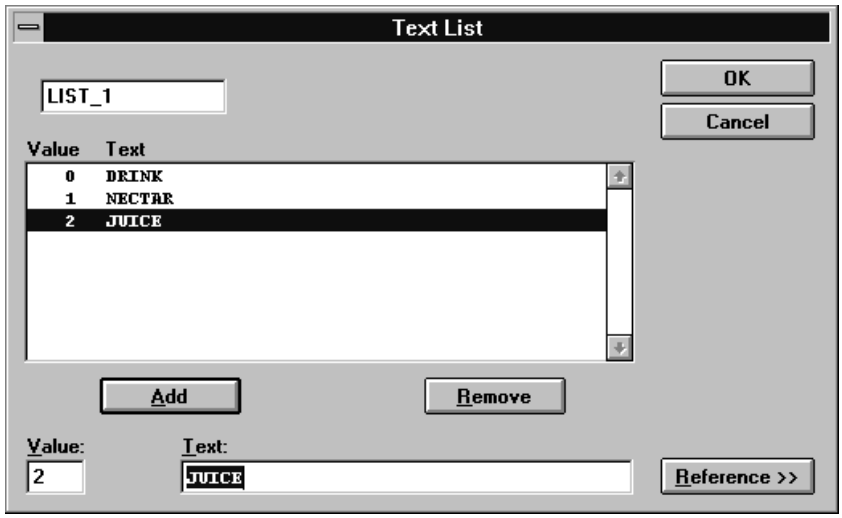



Figure 9-5 *Text or Graphic List - Text* Dialog Box

## 9.2 Creating and Transferring Data Records

**Identifying a recipe on the OP**

A recipe is stored under a symbolic name and under a number in your configuration. You also select a recipe by its name or number on the OP. You can modify the name and number of a recipe by choosing the *Attributes* button in the *Recipe* dialog box.

**Identifying a data record**

On the OP: You create a data record on the OP under a number and a symbolic name. The name is valid only on the OP. When transferring a data record to the PLC, the data record and recipe numbers are transfered.

On the PLC: The OP writes the data record number and the number of the corresponding recipe into a mailbox. On the SIMATIC S5, this mailbox is called the ”recipe number mailbox”, whereas on the SIMATIC S7 it is referred to as the ”data mailbox”. You set the addresses of the recipe number mailbox or the data mailbox by choosing *System→ Area Pointer* from the menu. On the S5, data are written to a recipe mailbox, whereas on the S7 data are written directly to the addresses.

You will find further information about the recipe number mailbox, data mailbox and recipe mailbox in the *Communication User Manual*.

**Synchronization during transfer**

A major feature with recipes is that data transfer is synchronized and any uncontrolled overwriting of data is inhibited. To insure a coordinated process when data records are transferred, bits are set in the control and check-back areas of the interface area.

**Storing data records**

The data records that you create on the OP are stored in FLASH memory. On the OP15, they can be stored alternatively on a floppy disk.

## 9.3 Example of Recipes and Data Records for SIMATIC S5

**Description**

This chapter takes you step by step through
- creating a recipe,
- creating data records on the OP and
- transferring data records to the PLC.

In our example, you will create a recipe for the mixing unit of a fruit juice system. You wish to mix different fruit juices on the same system. The ingredients are identical, only the ratios of mixture are different. You first create a recipe called *Mixture*, followed by a data record called *Juice*. This data record contains the ratio of mixture for orange juice. While the data record is being transferred, the OP sets bits in the control and check-back areas. You must then similarly set and reset bits in the PLC program to re-enable the recipe mailbox.

**Example system**

You create the example recipe for an OP5, which is connected to the SIMATIC S5 by means of AS511. It is the AG115U with CPU 944.

Open the standard configuration called `c:\prolite\standard\s_05.pdb`. Save this configuration under a new name – for example, `QUICKMIX.PDB`.

Set the SIMATIC S5 PLC with driver AS511 by choosing *System* → *PLC* → from the menu. Keep the symbolic name *PLC_1*. Press the *Parameters* button and select the following CPU: `S5 115UCPU944`.

**Creating a recipe with ProTool/Lite**

Call the editor for *recipes* and create the recipe described below. The recipe is shown in Figure 9-6.

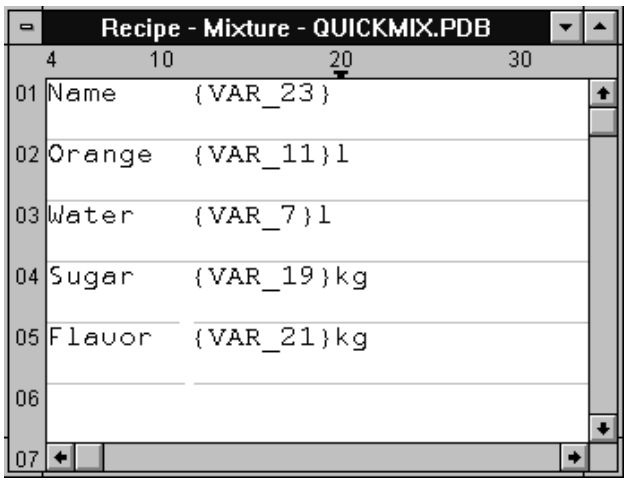



Figure 9-6 Editor for Creating Recipes

Create variable *Var_23* as a *Type* KF variable. The variable is one data word long. In the *Display* field, select Text Symbol and then create the following text or graphic list:

0 Drink

1 Nectar

2 Juice

Give the variable an address on the PLC – for example, DB 12, DW 0, field length 7 (the number of characters of the longest word on the text or graphic list). Specify *PLC_1* as the PLC. This means that you can use the variables on screens and in messages too.

Variables *Var_11*, *Var_7*, *Var_19* and *Var_21* are *Type* KF variables, all being one data word long. For the address, specify data block 12 too. With variable *Var_19*, specify the digits behind the decimal point as 1.

## Other essential settings

You must now specify the name of the recipe and create the recipe number mailbox and the recipe mailbox.

1. Choose *Recipe* → *Attributes* from the menu. The *Recipe Attributes* dialog box appears (refer to Figure 9-7). At this point, modify the name of the recipe to Mixture.

Bild 9-7 *Recipe Attributes* Dialog Box with Settings

2. For the name of the recipe to appear on the OP as well, you have to specify a title. Click the *Title* button. The following dialog box appears.

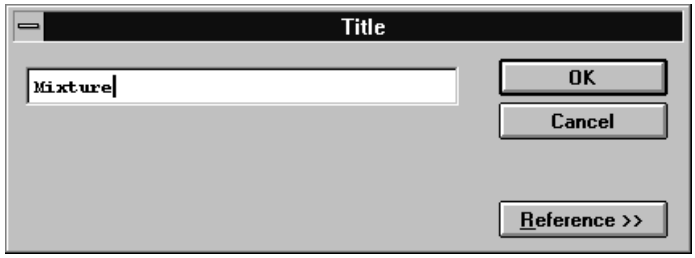



Bild 9-8 *Title* Dialog Box

3. Enter *Mixture* again.

   Exit from the dialog boxes by clicking the *OK* button in each dialog box. The name *Mixture* is now in the editor window under *Recipes* as an object as well as on the title line of the open *Recipes* editor.

4. Choose *System* → *Area Pointer* from the menu. Set the interface area here. Click *Add*. Set the following interface area:
   *DB:* 51
   *DW:* 0
   *Length:* 185

5. Choose *Recipe Number Mailbox* under *Type:* Click the *Add* button again. Set the recipe number mailbox as follows:
   *DB:* 13
   *DW:* 0
   *Length:* 1.

6. Repeat the procedure for the *Recipe Mailbox* type. Set the recipe mailbox as follows:
   *DB:* 14
   *DW:* 0
   *Length:* 29.
   You have to start at DW0.

   Figure 9-9 shows the aforementioned settings.

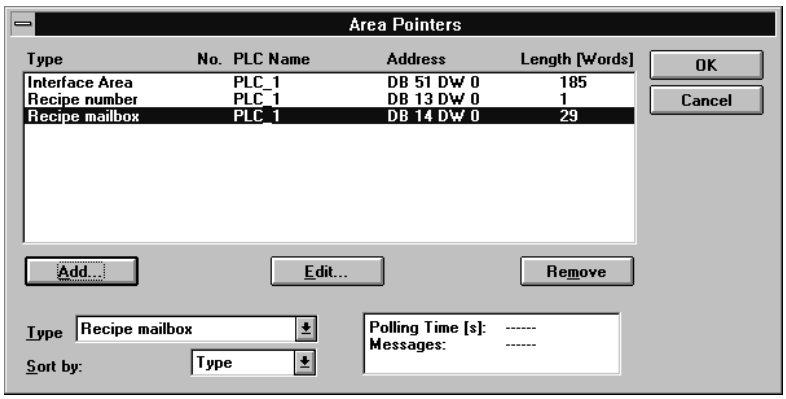



Bild 9-9 *Area Pointer* Dialog Box with Settings

### Downloading the configuration

Place the OP in Download mode. Save your configuration by choosing *File → Save* from the menu. Connect the OP to the PC or PU by means of the connecting cable. Go to *File → Download* on the menu system. Confirm that the configuration should be compiled first by answering `Yes` at the prompt.

After the download operation, the OP is at message level. The system displays the message `S5 not available`. Connect the OP to the CPU. The system message then disappears.

### Creating a data record on the OP

To create data records, choose screen *Basic Screen → Records → Edit*.

Select the *Mixture* recipe. With the OP5 and the OP15, you can also choose the recipe directly by pressing the SHIFT key and then the directory key.

Press ENTER. The OP shows the following output on the line display:

```
01 Data record
```

Press ENTER again. The line display shows:

```
01 Name: Drink
```

The cursor is positioned on `01`. Press the RIGHT arrow key. The cursor moves to `Drink`. Press SHIFT. With the UP and DOWN arrow keys, you can scroll through the symbolic names. Scroll until `Juice` is displayed. Press ENTER to save the first recipe entry.

Press the ENTER key to move to other recipe entries. Enter the mixture values for orange juice and save the values you enter by pressing ENTER after every entry:

```
02 Orange 95
03 Water 5
04 Sugar 0.5
05 Flavor 100
```

Enter the mixture values for orange juice and save the values you enter by pressing ENTER after every entry.

When you have finished work on the recipe entries, save the data record by pressing ESC twice in succession. The following prompt appears on the display:

```
No. 1
Name: Data Record
Save Data Record? Y
```

The cursor is positioned on *1*. No modifications have to be performed at this stage, since you have just edited the first data record. Press the RIGHT arrow key. The cursor moves to *Data Record*.

Now assign a name to the data record. You can do this with keys 1–9 and SHIFT + A .... F. Overwrite *Data Record* with `DE01` and delete the other characters using the key combination SHIFT + DEL.

Press the ENTER key to save the name you entered. Then press the RIGHT arrow key. The cursor moves to the Yes field. Press ENTER again. The following message appears on the OP.

```
No. 1
Name: DE01
Overwrite? Y
```

Press the ENTER key. Data record No. 1 is saved. The following message appears:

```
No. 1
Name: DE01
Data record saved.
```

Press ESC. The data record number with the new name is displayed.

```
01     DE01
```

### PLC requirements for transfer

Before you can transfer a data record from the OP to the PLC, you must create the following data blocks on the PLC:

- DB 12 for the variables in the recipe
- DB 13 for the recipe number mailbox
- DB 14 for the recipe mailbox
- DB 51 for the interface area.

You also require the following function blocks:

- FB 51;
  it governs communication between the OP and the PLC.
- FB 42;
  the OP and the PLC are synchronized in data word 64 of the interface area. FB 42 performs synchronization and then distributes the data to the addresses.

This means that organization blocks OB1 and OB20 to OB22 are structured as follows:

- OB1

```
:L KY 51,0
:SPA FB 51
:T FW 100
:L KY 51,0
:SPA FB 42
:BE
```

- OB20/21/22

```
:L KF +1
:A DB 51
:T DW 64
:BE
```

### Transferring the data record from the OP to the PLC

Choose *Basic Screen* → *Records* → *Transfer* from the menu. Choose this menu item by means of a soft key. Recipe 01 – *Mixture* – appears.

Press ENTER. The following display appears on the OP:

```
Source: 00  Dest.: 00
            Accept
PLC: 00/00    OP: 1
```

The cursor is located in the first field. Enter `1` for the source, since you want to transfer the first data record. Press ENTER to apply the input.

Press the RIGHT arrow key twice. The cursor is now located in the `Accept` field.

Then press ENTER to transfer the data record to the PLC. The following display appears:

```
Source: 00  Dest.: 00
            Accept
PLC: 01/01    OP: 1
```

Specifying `00` as the target means that the data record will be transferred from the OP to the PLC. If `00` is shown as the source, the data record is transferred from the PLC to the OP.

### Result

Function block FB42 distributes the values to the specified addresses.

# Functions

# 10

## Purpose

ProTool/Lite features a series of functions which you can use in your configuration. Functions are used to:

- compile a process-specific configuration, such as branching from one screen to another,
- use OP characteristics, such as display or print the message buffer,
- perform system settings in Online mode on the OP, such as modify interface parameters.

## Using functions

Before you can use functions on the OP, they have to be assigned to function keys or scheduler. They may be assigned to either soft keys or a global function key. Soft keys are assigned to screen entries and are located directly beneath the entry in the screen editor. You assign global function keys by choosing *System → Screen/ Keys* from the menu.

You will find a list of all the functions available in ProTool/Lite and their descriptions in Appendix A.

## Special feature on OP3, OP7, OP17

The OP3, OP7 and OP17 have a function which can be assigned to a variable.

## Assigning several functions

If you wish to assign a function to a function key, click in the screen editor or in the *System → Screen/Keys* dialog box on the displayed key. The *Function Keys* dialog box appears. In the dialog box, click the *Function* button (or *SHIFT+Function* in the case of global function keys). The dialog box shown in figure 10-1 appears.

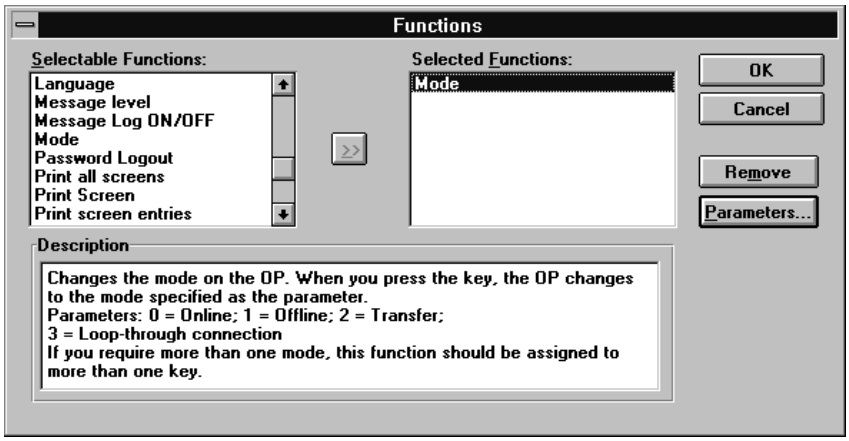



Figure 10-1 Functions Dialog Box

Select any one of the functions. If you click on the key having the double-headed arrow, the function is transferred to the field on the right.

**Parameter**

Some functions feature several settings. For example, the *Mode* function offers several options. By means of the parameter, you then specify which of the settings that are possible should be enabled. Pressing the function key on the OP then initiates the function with its set parameters – for example, *Download* mode. Figure 10-2 shows the setting of the parameter.

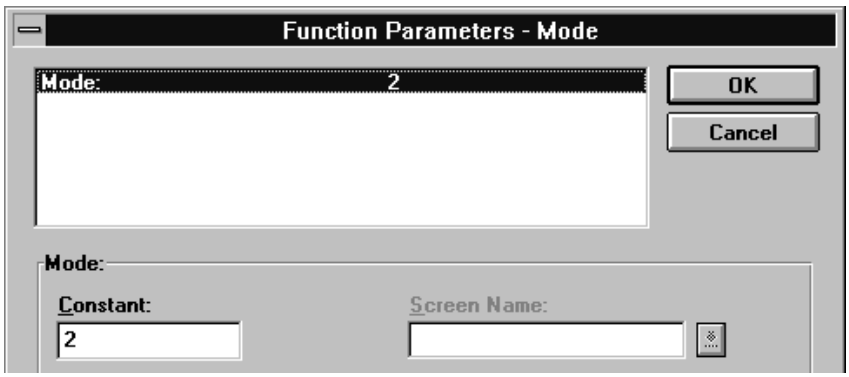



Figure 10-2 Dialog Box for Setting Function Parameters

Generally speaking, we differentiate between two different kinds of function:

– functions without parameters

– functions with parameters

Functions without parameters include, for example, *Print Message Buffer* or *Password Logout*. A parameter is not required in this particular instance since the assignment with the function is already clear.

Functions with parameters require specification of the object for which or the setting with which the function is required to be executed.

The functions which refer to an object include, for example, *Select Screen* or *Print Screen Entries*. In this instance you have to specify the name of the screen as the parameter. Whenever you wish to edit objects, use this kind of function.

The functions with different settings include, for example, *Message Log ON/OFF* and *Mode*. In this case, you assign precisely one setting to a function. Should you wish to use several settings, you have to assign several keys to this function, each with different parameters.

### *Select Function Screen* function

The *Select Function Screen* function accesses internal screens. These screens are stored in the firmware and cannot be modified in the configuration. When a function screen is called, the function is not executed directly. The operator is shown a screen on which he can initiate the function. Function screens are integrated into the configuration with the *Select Function Screen* function.

Some functions can be configured both directly by means of a function (one-shot function) and by means of a function screen – for example, *Message Log ON/OFF*. For the one-shot function, you specify a parameter. The function is then directly initiated on the OP with the set parameter. In the case of function screens, the operator can select a parameter and then initiate the function.

If a function is present in your configuration as a one-shot function and as a function screen, the current status of the function is displayed when the function screen is called.

All the available function screens are used in the standard screens supplied to you.

### Example

The *Alarms – Display First/Last* function and the Last parameter have been assigned to a soft key. When the key is pressed on the OP, the Last" setting is applied. The *Function Screen* function and the *First/last AM* parameter have been assigned to a function key. When the function key is pressed on the OP, the function screen for setting alarm message display is called. It has the following appearance:

```
Message display:  Last
```

The function screen shows the current status, i.e. displays the last alarm message to arrive.

Using the arrow keys, you can now select a different setting on the OP and apply it by pressing ENTER.

### OP3, OP7, OP17: Functions with variables

The OP3, OP7 and OP17 have one function that can be assigned only to a variable. This is the *Scaling linear* function.

# General Communication Areas

# 11

**Contents**

This chapter describes data areas used by the OP and the PLC to communicate with each other. These data areas are required only when you wish to use the corresponding OP functions. You then have to create the data areas on the PLC and set them in the configuration.

## 11.1 Interface Area for Non-SIMATIC PLCs

**Usage**

The interface area described below applies to all PLCs except SIMATIC PLCs. The interface area for SIMATIC PLCs is described in the *Communication User's Manual*.

The interface area is required when you use the following functions:

- send PLC jobs to the OP
- synchronize date and time between the PLC and the OP
- test version number
- recipes (transfer of data records)
- detect OP startup in the PLC program
- evaluate the OP mode in the PLC program
- evaluate the OP life bit in the PLC program

## Creating the interface area

You set the interface area in ProTool/Lite by choosing *System → Area Pointers* from the menu. In addition, the area has to be available on the PLC. Figure 11-1 shows the structure of the interface area.

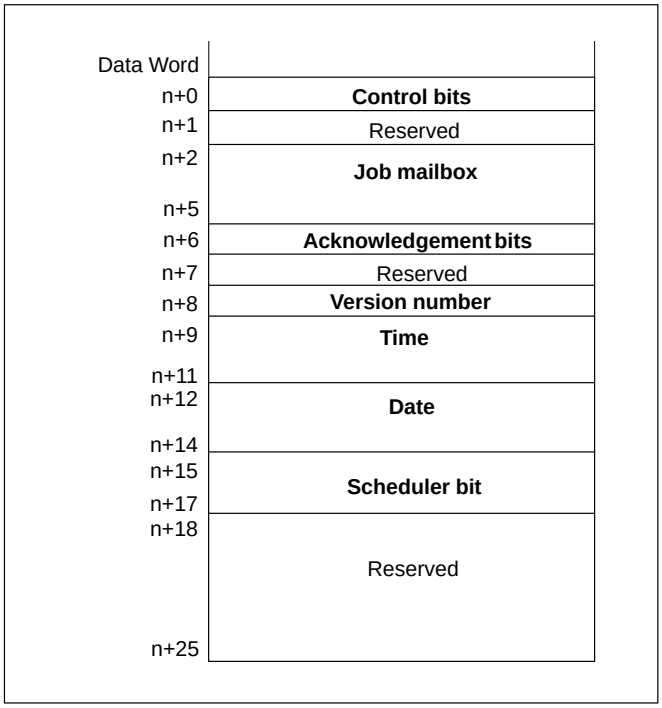



Figure 11-1 Structure of the Interface Area in Data Words

## Counting direction of bits

The counting direction of the bits in a data word depends on the PLC. It may be clockwise, starting at 0, or counter-clockwise, starting at 1.

When data words are illustrated in the description that follows, there are always two illustrations. If only one bit is mentioned, its number is shown
– without parentheses for a clockwise direction
– with parentheses for a counter-clockwise direction

## 11.1.1 Control and Acknowledgement Bits

**Introduction**

A word is available for every control and acknowledgement bit. Word n+0 contains the control bits. Control bits are written by the PLC and read by the OP. Word n+6 contains the acknowledgement bits. They are written by the OP and read by the PLC.

**Detailed structure of control and acknowledgement bits**

The following illustrations show the detailed structure of the control and acknowledgement bits. This is followed by a description of achieving synchronization of the OP with the PLC by setting bits.

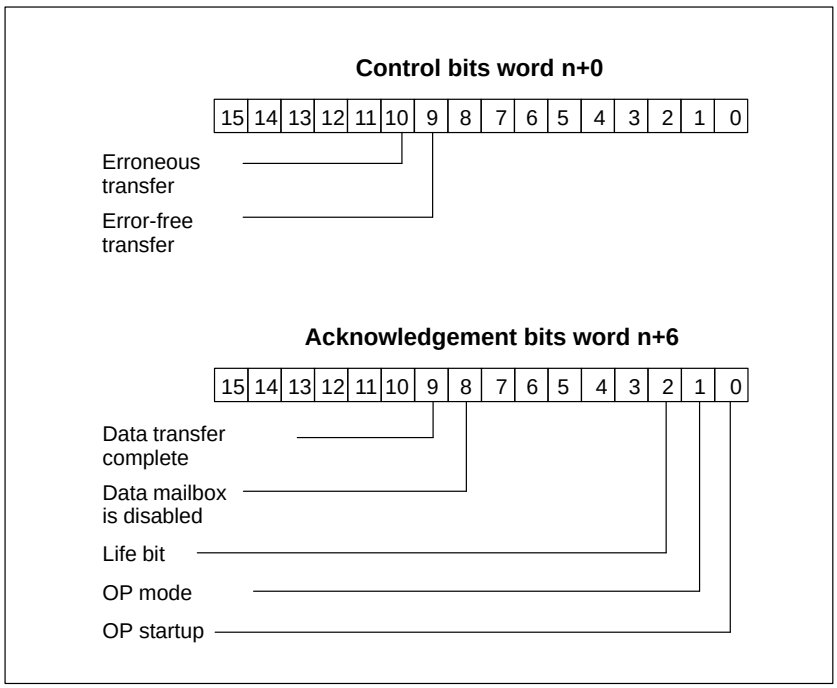

Control bits word n+0
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Erroneous transfer
Error-free transfer
Acknowledgement bits word n+6
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Data transfer complete
Data mailbox is disabled
Life bit
OP mode
OP startup

Figure 11-2 Control and Acknowledgement Bits for Clockwise Direction

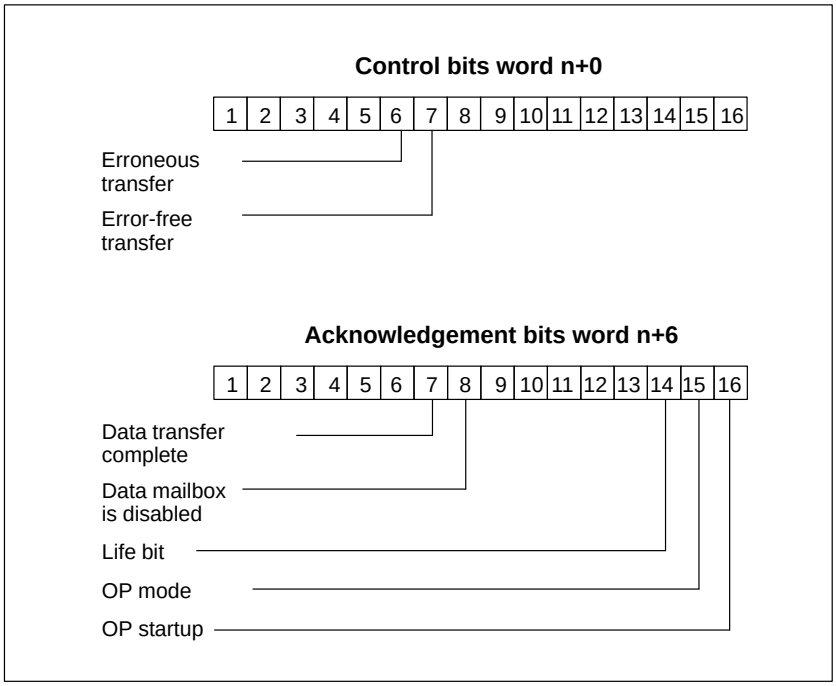

Control bits word n+0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Erroneous transfer
Error-free transfer
Acknowledgement bits word n+6
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Data transfer complete
Data mailbox is disabled
Life bit
OP mode
OP startup

Figure 11-3 Control and Acknowledgement Bits for Counter-Clockwise Direction

**OP startup**

**Bit 0(16)[1] in acknowledgement bits**

1= OP has started
0 = OP is starting

The bit is set by the OP when startup has finished.

**OP mode**

**Bit 1(15) in acknowledgement bits**

1 = OP is offline
0 = OP in normal mode

The bit is set if the OP is switched to Offline mode by the operator. In Online mode, the bit is set to 0.

**Life bit**

**Bit 2(14) in acknowledgement bits**

The purpose of the life bit is to insure that any disruption of the connection from the OP to the PLC is detected immediately. The OP inverts the life bit in the interface area at regular intervals.

[1] The number in brackets refers to the counter-clockwise direction

### Synchronizing the transfer of data records

**Control bits:**

**Bit 10(6)**[1] `1` = Data record/variable is erroneous
`0` = Evaluation not performed

**Bit 9(7)** `1` = Data record/variable is erroneous
`0` = Evaluation not performed

**Acknowledgement bits:**

**Bit 9(7)** `1` = Data transfer ended
`0` = Evaluation not performed

**Bit 8(8)** `1` = Data mailbox is disabled
`0` = Data mailbox is vacant

The control and acknowledgement bits in the interface area synchronize the transfer of data records. The standard case is that a transfer is initiated by means of an operator input on the OP.

### Transferring OP → PLC (OP initiated)

The following description deals with the process of setting sync bits by the OP and the reaction to them by the PLC program.

**Step 1:** Bit 8(8) of the acknowledgement bits is checked by the OP. If bit 8(8) is set to `1` (= data mailbox disabled), the transfer is completed with a system error message. If bit 8(8) is set to `0`, the OP sets the bit to `1`.

**Step 2:** The OP enters the identifications in the data mailbox.

With a data record that is required to be transferred indirectly, the values of the variables are also written to the data mailbox. With a data record that is required to be transferred directly, the values of the variables are written to the configured address.

**Step 3:** The OP sets bit 9(7) of the acknowledgement bits to `1`
(= data transfer complete).

**Step 4:** Acknowledge in the PLC program whether the transfer was error-free or erroneous.
Error-free: Bit 9(7) is set to 1
Erroneous: Bit 10(6) is set to 1

**Step 5:** The OP resets bits 9(7) and 8(8) of the acknowledgement bits.

**Step 6:** Bits 10(6) and 9(7) have to be reset in the PLC program.

[1] The number in brackets refers to the counter-clockwise direction

## 11.1.2 Data Areas in the Interface Area

### General

This section describes the structure and usage of user data areas located in the interface area.

The PLC initiates an action on the OP via the job mailbox. All the other bytes are areas to which the OP writes data. These areas can be evaluated by the PLC program. The bytes are described in detail below.

### Job mailbox

**Word n+2 through n+5**:
PLC jobs can be transferred to the OP via the job mailbox, thus initiating actions on the OP.

The job mailbox consists of four words. The first word of the job mailbox contains the job number. The job parameters (three at most) have to be entered in the other words.

**Job mailbox:**

| Data Word | 1 16 |
|---|---|
| n+2 | Job No. |
| | Parameter 1 |
| | Parameter 2 |
| n+5 | Parameter 3 |

If the first word of the job mailbox is not equal to zero, the OP evaluates the PLC job. The OP resets this data word thereafter to zero. For this reason it is necessary to enter the parameters in the job mailbox before entering the job number.

The PLC jobs that are possible are listed with their job numbers and parameters in Appendix C.

### Version number

**Word n+8**

The OP enters the version number of the driver in word n+8. It can be evaluated by the PLC program.

## Date and time

**Time = Words n+9 through n+11**
**Date = Words n+12 through n+14**

PLC job 41 can initiate the transfer of time and date from the OP to the PLC.

Figure 11-4 shows the structure of the data area. All specifications are BCD-coded.

| | Left byte | Right byte | |
|---|---|---|---|
| Address | 16 9 | 8 1 | |
| n+9 | Not assigned | Hour (0 to 23) | Time |
| n+10 | Minute (0 to 59) | Second (0 to 59) | |
| n+11 | Not assigned | | |
| n+12 | Not assigned | Day (1 to 7) | Date |
| n+13 | Day (1 to 31) | Month (1 to 12) | |
| n+14 | Year (0 to 99) | Not assigned | |

Figure 11-4 Structure of the **Time** and **Date Data Area**

To detect when the date and time were transferred, you should set the data words to `0` before initiating the PLC job.

## 11.2 OP Keyboard and LED Assignments

**Usage**

Key operations on the OP can be transferred to the PLC and then evaluated. In this way it is possible to draw the operator's attention to the incorrect operation of a key by means of, say, a message.

The light-emitting diodes (LEDs) on the function keys of the OP can be driven by the PLC. This means that it is possible, for example, to indicate to the operator by means of a lit LED on a key, depending on the situation, that he should press a specific key.

**Condition**

To be able to use this option, you have to create suitable data areas – called assignments – on the PLC and to specify them as *area pointers* in your configuration.

**Transfer**

Keyboard assignments are transferred spontaneously to the PLC, meaning that a transfer is performed whenever a modification has been registered on the OP. There is therefore no need to configure a polling time.

Only a key that has been pressed is transferred.

**Assigning values**

**All keys (apart from SHIFT)**

While the corresponding key is pressed, its assigned bit in the keyboard assignment has 1 as its value; at all other times its value is 0.

---

**Note**

If the OP is switched off while the key is pressed or if it is separated from the PLC, the corresponding bit will remain set in the keyboard assignment.

---

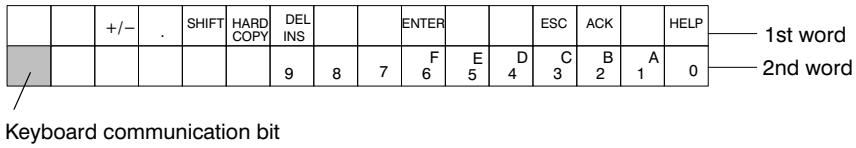
## 11.2.1 System Keyboard Assignment

### Structure

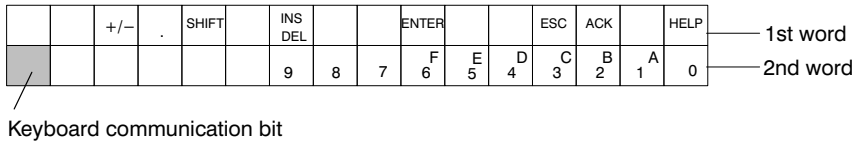
The system keyboard assignment is a data area having a fixed length of two data words. To be able to use the system keyboard assignment, you have to create a *system keyboard* type data area under *Area Pointers* in your configuration.

Precisely one bit is permanently assigned in the system keyboard assignment to every key belonging to the system keyboard.

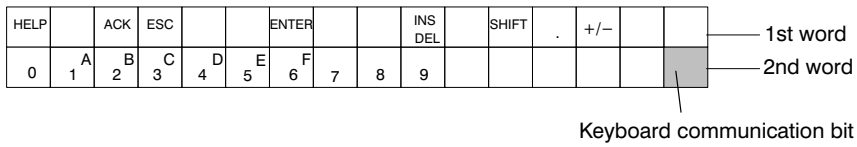
**Keyboard assignment for OP5, OP15, C7-623 and C7-624 (counting clockwise)**:




**Keyboard assignment for OP7 and OP17 (counting clockwise)**:




**Keyboard assignment for OP7 und OP17 (counting counter-clockwise)**:




**Note**

Unused bits must not be overwritten by the user program.

### Keyboard communication bit

The keyboard communication bit is used as a check bit. It is set to `1` every time the keyboard assignment is transferred from the OP to the PLC and should be reset following evaluation of the data area by the user program.

By regular reading of the communication bit, it is possible to determine in the user program whether the keyboard assignment has been re-transferred.

## 11.2.2 Function Keyboard Assignment

**Data areas**

The function keyboard assignment can be divided into separate data areas, which are shown in the following table. To use the function keyboard assignment, you have to create a *function keyboard* type data area in your configuration under *Area Pointers*.

| Data Areas | All Devices |
|---|---|
| Maximum number | 4 |
| Overall length of all data areas (words) | 4 |

**Key assignment**

The assignment of the different keys to the bits of the data areas is set when the function keys are configured. In this context, the number within the assignment area is specified for every key.

**Keyboard communication bit**

The highest order bit of **every** data area is the keyboard communication bit. It is used as a check bit. The keyboard communication bit is set to `1` every time the keyboard assignment is transferred from the OP to the PLC. After the data area has been evaluated by the user program, the keyboard communicaton bit should be reset.

By regular reading of the communication bit, it is possible to determine in the user program whether a block has been re-transferred.

## 11.2.3 LED Assignment

**Data areas**

The LED assignment can be divided into separate areas, as the following table shows. To use the LED assignment, you have to create a *LED assignment* type data area in your configuration under *Area Pointers*.

| Data Areas | All Devices |
|---|---|
| Maximum number | 4 |
| Overall length of all data areas (words) | 9 |

**Polling time**

If a polling time of 0 is specified for a data area, it is not transferred cyclically to the OP. To drive the LEDs, PLC job No. 42 has to be used (refer to Appendix C).

**LED assignment**

The assignment of the different LEDs to the bits of the data areas is set when the function keys are configured. In this context, the number of the assignment area and the bit number within this area are specified for every LED.

Bit number (n) denotes the first of two successive bits, which control a total of four different LED states (refer to Table 11-1):

Table 11-1 LED Functions for the OP5, OP15, OP7 and C7-623 and C7-624 (Counting Clockwise)

| Bit n + 1 | Bit n | LED Function |
|---|---|---|
| 0 | 0 | Off |
| 0 | 1 | Flashing at approx. 2 Hz |
| 1 | 0 | Flashing at approx. 0.5 Hz |
| 1 | 1 | Permanently on |

Table 11-2 LED Functions for the OP5, OP15, OP7 and C7-623 and C7-624 (Counting Counter-Clockwise)

| Bit n + 1 | Bit n | LED Function |
|---|---|---|
| 0 | 0 | Off |
| 0 | 1 | Flashing at approx. 0.5 Hz |
| 1 | 0 | Flashing at approx. 2 Hz |
| 1 | 1 | Permanently on |

On the OP17, the K keys have two-coloured LEDs (red/green). You will find the resulting LED functions in Table 11-3.

Table 11-3 LED Functions for the OP17 (Counting Clockwise)

| Bit n + 1 | Bit n | LED Function |
|---|---|---|
| 0 | 0 | Off |
| 0 | 1 | Flashing red |
| 1 | 0 | Permanently red |
| 1 | 1 | Permanently green |

Table 11-4 LED-Funktionen für OP17 (zählweise links → rechts)

| Bit n + 1 | Bit n | LED-Funktion |
|---|---|---|
| 0 | 0 | Off |
| 0 | 1 | Permanently red |
| 1 | 0 | Flashing red |
| 1 | 1 | Permanently green |

## 11.2.4 Hints on Optimization

**Polling time and update time**

The polling times specified in the configuration software for *area pointers* and the polling times for variables are important aspects for the update times actually achieved. The update time is polling time plus transfer time plus processing time.

To achieve optimum update times, observe the following points when you are configuring:

- Make the different data areas as small as possible and as large as necessary.
- Define contiguous data areas when they belong together. The actual update time improves if you create one large area as opposed to several smaller ones.
- Polling times that have been dimensioned too short unnecessarily degrade overall performance. Set the polling time commensurate with the speed of variation of process values. The temperature variation of a furnace, for example, is distinctly more inert than the variation in speed of an electric drive.

  Recommended value for polling time: approx. 1 second.
- Do without cyclic transfer of the user data areas, if necessary, to improve update times (polling time 0). In its place, use PLC jobs to transfer the user data areas spontaneously.
- Place the variables of a message or a screen without gaps in a data area.
- So that modifications on the PLC can be properly detected by the OP, they must be present at least during the actual polling time.

# Configuring in Different Languages 12

## Display levels

With languages, we generally speaking distinguish between two display levels. The levels are:

- the *user interface language* of ProTool/Lite.
  The *user interface language* is the language in which text is displayed in the menus and dialog boxes of ProTool/Lite.
- the *configuration language* for the OP.
  The *configuration language* is the language in which you create your configuration. This is the language in which your configuration appears on the OP.

## Interface language

The interface language has to be defined when ProTool/Lite is installed. You can set the following languages:

- German,
- English,
- French,
- Italian and
- Spanish.

## Configuration language

You can create the configuration in all of the above languages. With the OP7, OP15C and OP17, Russian is possible as well. You can load up to three of the possible configuration languages on the OP simultaneously.

When ProTool/Lite is called, the configuration language is the same as the windows language. The configuration language is changed by choosing *Edit → Language* from the menu. If you wish to set a different configuration language or if you have completed your configuration in one language and now wish to configure the next one, choose this menu item.

## Editing and reference languages

The dialog box shown in figure 12-1 appears; here you set the ***editing language*** and the ***reference language***.

- The *editing language* is the current configuration language in which configurable text is entered.
- The *reference language* should be regarded from the viewpoint of translation. If, for example, you are configuring your second language, you can display the text of the first language as a reference language. This means that you can view the first language as a basis for your translation.

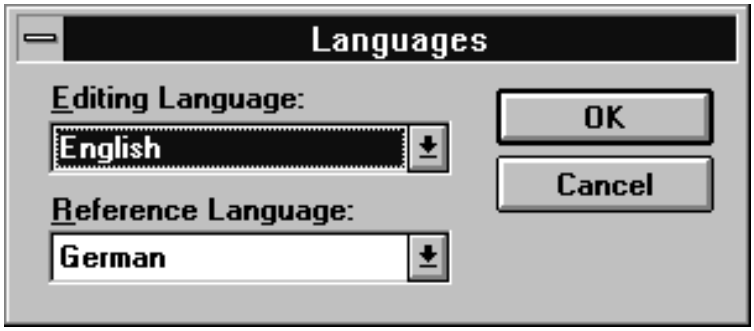



Figure 12-1 Dialog Box for Language Settings

In the *Languages* dialog box, the language set as the default editing and reference language is the language in which you installed Windows on your PC. If you wish to modify the editing or reference language, proceed as follows:

- If you have built on top of a standard configuration, you can simply assign one of the following languages as the editing and reference language:
  - German,
  - English,
  - French,
  - Italian,
  - Spanish.

  Standard screens are available for every one of these five languages.
- If you have created a configuration without building on top of a standard configuration, then only the default language is available. You have first to add languages for selection.

### Adding languages for selection

To do this, call *System* → *Language Assignment* from the menu. The *Language Assignment* dialog box appears, showing the default language.

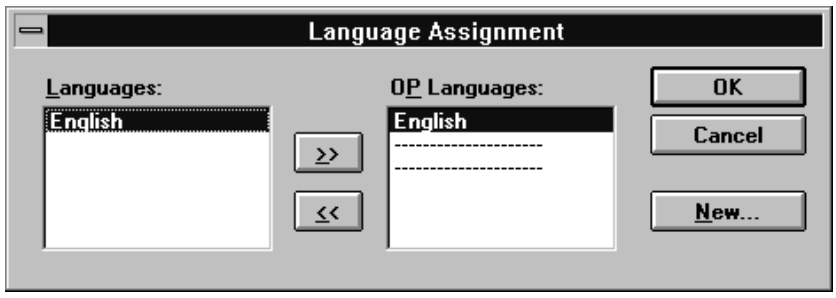



Figure 12-2*Language Assignment* Dialog Box

Click the *New...* button. The *Add Language* dialog box appears.

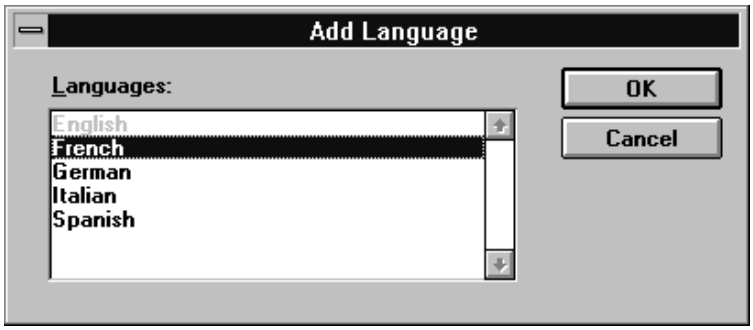



Figure 12-3*Add Language* Dialog Box

Select the language you require and click *OK*. The *Add Language* dialog box is closed. The language you selected is listed in the *Language Assignment* dialog box under Languages. Close the *Language Assignment* dialog box as well by clicking *OK*.

The new language you selected can now be set as the editing and reference language and can also be applied as the OP language.

### Objects with language-dependent text

The following objects contain language-dependent text:

- event messages,
- alarm messages,
- screens,
- symbol lists and
- recipes,
- headers and footers.

### Information text

Information text is similarly language-dependent. Information text can be configured for:

- input fields,
- combined input/output fields,
- screens,
- screen entries,
- recipes,
- recipes entries and
- messages.

### Configuring in several languages

If you wish to create a configuration in several languages, you should first configure just one language and then test your configuration with the PLC program. When you have done this, you can enter your text in the other languages.

**Note**

If you wish to modify a configuration that has already been created in various languages, then avoid having later to move configured fields in event messages and alarm messages. As there is no permanent assignment between a field and its position within text, not the fields but the text strings should be moved, if necessary.

### Configuring in Russian

To enter Cyrillic characters, choose *Edit → Language* from the menu and select *Russian*. You can now enter Cyrillic characters using all the lowercase letters. You will find a table with assignments of Latin letters and Cyril lic characters in Appendix B. Capital Latin letters and numerals are still available on the keyboard.

### Foreign-language keyboard assignment

When you select a language in the *Editing Language* input field by choosing *Edit → Languages...* from the menu, the corresponding character set is loaded and the key assignment is modified. If the editing language is different from the Windows language, a keyboard assignment with the new key allocation appears on the screen (refer to Figure 12-4). You can now see where the characters that are different are located on your keyboard and you can enter them. Alternatively, you can click the cursor on the keys of the keyboard assignment to enter a character in an editor.

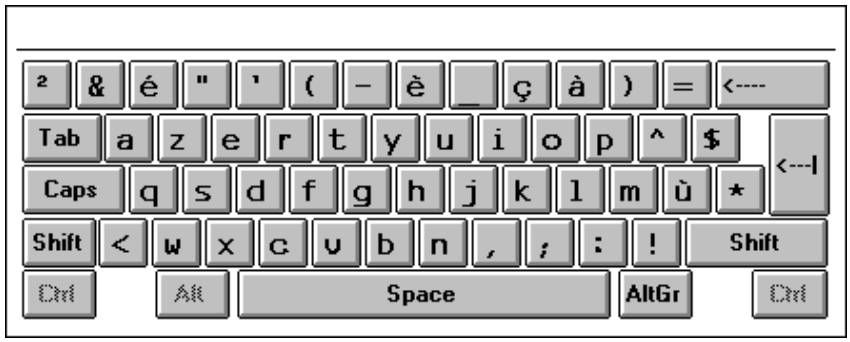



Figure 12-4Example of a Keyboard Assignment with French as the Editing Language

The keyboard assignment is hidden automatically when you change the editing language back to the Windows language. You can, however, deactivate it by choosing *Window → Keyboard* from the menu.

### Setting OP languages

Before the configuration is downloaded to the OP, set the OP languages by choosing *System → Language Assignment* from the menu (Figure 12-5).

Figure 12-5 Setting OP Languages

OP languages are the languages that you can select on the OP. Select up to three of the existing configuration languages in succession as OP languages. These languages are downloaded with the configuration to the OP in Download mode. The first language to be entered is the one that is set subsequent to OP start-up. You can switch to another language during routine operation.

With the ≫ button you can select up to three OP languages in succession from the list box on the left.

With the ≪ button you can remove individual languages from the list of OP languages.

You can change the OP languages in your configuration. If, for example, you wish to load the same configuration on several OPs with different languages, you can change the OP languages prior to Download.

Depending on the OP language that you set, the OP automatically accesses the internal character set.

---

**Note**

Depending on the device, not all characters in the ANSI character set can be displayed on the OP. You will find a table containing the device-specific characters in Appendix B.

---

# General Settings for the System 13

**In this chapter**

This chapter gives a brief account of all the settings concerning the OP. Some of the settings have already been mentioned in other chapters when the context made it necessary.

This chapter represents a summary of all the settings that are possible. Settings are made by choosing ***System*** from the menu. You can then choose the following from the submenus:

**Screen/Keys**

At this point you assign global function keys. *Global* means that the assignment is valid for the whole configuration.

**Parameters**

At this point you make general settings for the OP. The menu item is divided into three submenu items. They are:

*Messages*
This menu item contains settings which are common to all editors. They include the printout of messages, display options for alarm messages, warning on buffer overflow and language-dependent identification of messages in the buffer.

*Firmware*
At this point you set the firmware for compilation. At the same time you are also given details of the firmware on the connected OP.

*Miscellaneous*
At this point you make general settings, such as setting the password for the superuser, the language-dependent time and date formats and defining the user version of the configuration.

**Printer**

At this point you make all the settings for the printer connected to the OP. They include the printer type and the interface parameters. The settings for the OP are made in the following two submenu items:

*Interface*
At this point you set the interface parameters such as baud rate, level (TTY or V.24) and the interface to which the printer is physically connected.

*Settings*
At this point you set the type of printer. You can define several printers as OP printers. For the OP, the first printer on the text list is the default printer. If a printer other than the default printer is attached, you must change the printer type online on the OP by means of the *Printer Setting* standard screen.

**Memory Requirements**

shows the amount of storage space your configuration will require in the OP memory.

**PLC**

At this point you set the PLC to which the OP is connected. At the same time you set the protocol and the protocol parameters used by the OP and the PLC to communicate with each other.

**Area Pointers**

At this point you set the data areas required for communication between the OP and the PLC. The data areas must be present on the PLC. By choosing *Area Pointers*, you announce to the PLC the data areas which it should access. The data areas that have to be set depend on the objects you configured. Table 13-1 contains an overview of the occasions when the different data areas are required.

**Language Assignment**

At this point you set the languages that you want to have at your disposal on the OP. A configuration can be created in a maximum of six languages. Of these languages, not more than three can be set as OP languages.

**Summary**

Table 13-1 shows who can read from and write to the different data areas which can be configured under *Area Pointers*. The area pointers are sorted in alphabetical order. The abbreviations ”R” and ”W” have the following meanings:

| | |
|---|---|
| R | Read |
| W | Write |

Table 13-1 Use of Area Pointers

| Data Area | Required for | OP | PLC |
|---|---|---|---|
| User version | Checking version by the PLC | R | W |
| Event messages | Configured event messages | R | W |
| Screen number area | Evaluation by PLC as to which screen is currently open | W | R |
| Function keyboard | Evaluation by PLC as to which function key was pressed | W | R |
| LED assignment | Driving the LED by PLC | R | W |
| Acknowledgment PLC | Acknowledgment of an alarm message by PLC | R | W |
| Acknowledgment OP | Message from OP to PLC that an alarm message has been acknowledged | W | R |
| Recipe number | Recipes; Contains recipe number and data record number | R[1] | W[1] |
| Data mailbox | Recipes; Contains recipe number and data record number | W[2] | R[2] |
| Recipe mailbox | Recipes; Contains data record | W[1] | R[1] |
| Successive recipe mailbox | Recipes; Contains data record overflow from recipe mailbox | W[1] | R[1] |
| Interface area | Communication between OP and PLC (essential for SIMATIC S5) | RW | RW |
| Alarm messages | Configured alarm messages | R | W |
| System keyboard | Evaluation by PLC as to which system key has been pressed | W | R |

[1] = SIMATIC S5 only
[2] = SIMATIC S7 only

# Compiling and Downloading a Configuration to the System

# 14

## Configuration

You have to compile a configuration before you can download it to the OP. ”Compile” means that a file that can be executed on the OP is created from the configuration.

During the compilation process, consistency checks are made. If specifications are missing or incorrect, appropriate error messages are written to a log window. If, for example, event messages have been configured but an event message area has not been created under *Area Pointers*, an error message is issued.

## Memory requirement

When compilation is over, you can determine, by choosing *System* → *Memory Requirements*, how much storage space your configuration requires on the OP. Figure 14-1 shows the dialog box. If the compiled file is larger than the memory on the OP, you will have to make your configuration smaller.

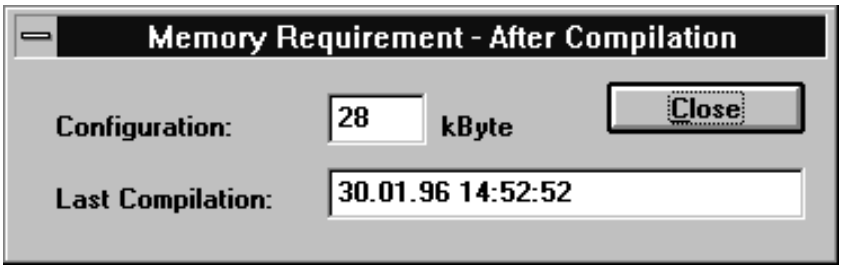



Figure 14-1 Memory Requirement Dialog Box

## 14.1 Downloading the Configuration to the OP

**Device-specific downloading**

The configuration can be downloaded in two different ways for specific devices:

- serially, by means of a direct link from the PU or PC to the OP.
  The AS511 protocol is used for downloading. This type of download is possible with the OP3, OP5, OP7, OP15 and OP17.
- by means of MPI network configuration.
  In this particular instance, the PU or PC and the OP are located in the MPI network configuration. The MPI protocol is used for downloading. This type of download is possible with the OP3, C7-623 and C7-624.

**Baud rate**

Bear the following points in mind when setting the baud rate:

- With a cable set for level TTY (PU cable), the maximum baud rate you can set is 9600 bauds. Higher baud rates can be used only with a cable set for level V.24.
- With a low-performance PC or PU, you have to decrease the default baud rate of 56000 bauds in steps until reliable downloading is possible. A low-performance PC or PU means, for example, a 80386 processor and/or clocking at 25 MHz.

## 14.2 Downloading Serial

**Procedure**

The procedure is described here in general terms. You will find further details in the device manual concerned.

To download the configuration from the PU or PC to the OP, do the following:

1. Connect the OP with the interconnecting cable to the PC or PU.
2. Set the OP to Download mode.
3. Set the interface of the PU or PC by choosing *File → PC Interface* from the menu.
4. Start downloading of the configuration by choosing *File → Download* from the menu.
5. When downloading has finished, the OP starts up and issues the standby message.

## 14.3 Downloading with MPI

**Procedure**

To download the configuration from the PU or PC to the OP, do the following:

1. Include the PU or PC in the MPI network configuration. To do this, there must be a MPI board in the PU or PC. Further, the STEP 7 software must be installed.
2. Include the OP in the MPI network configuration. Take account of the following notes for the MPI address.
3. Set the OP to Download mode.
4. Set the interface of the PU or PC by choosing *File* → *PC Interface* from the menu.
5. Start downloading of the configuration by choosing *File* → *Download* from the menu.
6. Specify the MPI address.
7. When downloading has finished, the OP starts up and issues the standby message. With OP7 and OP17 the start screen is opened, if it has been configured.

**Setting the MPI address for the OP3**

Figure 14-2 shows a MPI configuration with an OP. If you include in the MPI configuration an OP on which a configuration has yet to be loaded, by default it will have the MPI address `1`.

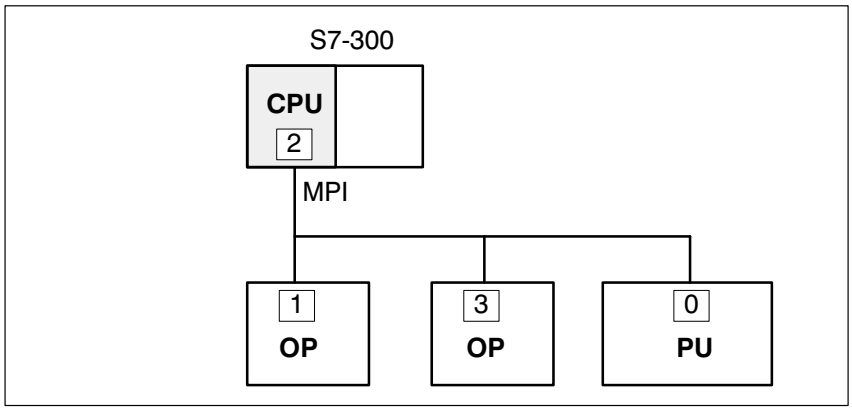



Figure 14-2 MPI Configuration with the OP

If you now load a configuration on the OP through the MPI, you must specify MPI address `1`. In the configuration choosing *System* → *PLC*, however, you gave the OP MPI address `3`. After the configuration has been downloaded, the OP has the MPI address `3`.

**Several OPs in MPI configuration**

If you wish to include several OPs in the MPI configuration, you must include them one by one. Connect one device physically first. Then download the configuration. You can then physically connect the next device. If you were to connect both devices physically first and then download the configuration, this would result in conflicts of address. Both devices have the same address. This is not allowed in the MPI configuration.

## 14.4 Troubleshooting Configuration Download Problems

**Driver incompatibility**

When you are downloading the configuration to the OP, problems may occur. In most cases, the reason is the simultaneous use of different drivers on the PU or PC – for example, with a connection to a network. Table 14-1 lists possible problems and their reasons, and how to deal with them.

Table 14-1 Potential Download Problems and Their Reasons

| Problem | Reason | Remedy |
|---|---|---|
| Download is aborted after the repeated occurrence of the message: `Line Error`. | Another driver is active in the background – for example, in network operation. | Modify your `autoexec.bat` and `config.sys` files. |
| Download does not take place. | Your `system.ini` file in the Windows directory does not contain the Windows standard communications driver which ProTool requires. | Check whether the `system.ini` file contains the following entry: `comm.drv=comm.drv`. If a different driver has been entered, installed communication programs for, say, a modem or network are using another driver. Modify the configuration of your PC or PU or install ProTool/Lite on a stand-alone PU or PC. |
| | Interrupt problems. Different boards are using the same interrupt. | Modify the configuration of your PC or PU, or install ProTool/Lite on a stand-alone PC or PU. |

# Printing a Configuration

# 15

**In this chapter**

You can print all or part of the current configuration. *Part* means that you can print either one or more *chapters* or individual pages of a *chapter.* The expression *chapter* refers to the type of object. All the objects of any one type are printed in a separate *chapter.*

**Standard reports**

Some standard reports are featured in ProTool/Lite ex works. They are:

- Complete,
- Screens,
- Event messages,
- Alarm messages,
- Variables,
- Recipes,
- Area pointer.

**Initiating printout**

Printing is initiated by choosing *File* → *Print*. Figure 15-1 shows the dialog box. The printer and printer option settings automatically correspond to the standard Windows functions which you set for your computer.

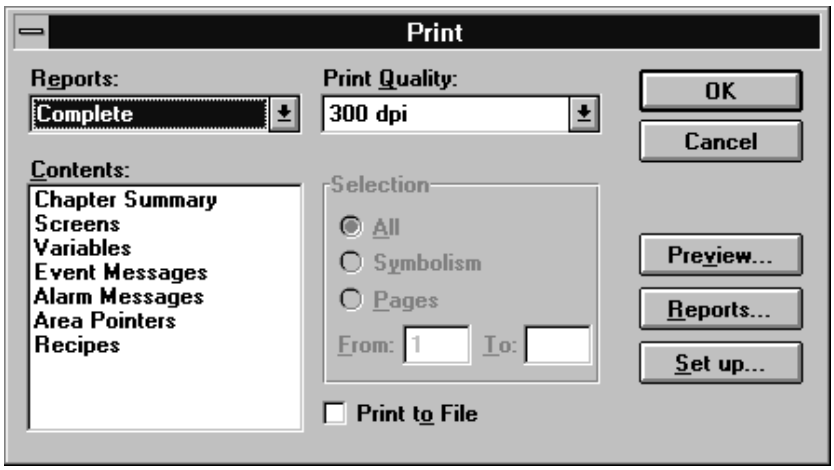



Figure 15-1 Print Dialog Box

In the editors for event messages, alarm messages, screens, recipes, headers and footers, an editor-specific menu item is available on the menu bar. If you choose *Print* at this point, the associated standard report is set.

### Print to file

You can also print to a file. For this, check in the *Print* dialog box the *Print to File* field. If you now click the *OK* button, you are requested to specify the file name. The configuration is then prepared in accordance with the printer that you set and the data are written to the file.

### Printing separate pages

You can also print separate pages of a chapter. To do this, click the corresponding chapter in the *Selection* box and specify under *Selection* the pages which you wish to print.

### Settings

You can create your own style for printouts of the configuration. In this particular instance, you should remember that all settings for reports are common to all projects. The following settings are possible for reports:

- margins,
- text for headers and footers,
- parameters for individual chapters,
- creation of reports which you have defined yourself.

### Preview

Pressing the *Preview* button provides a preview of the printout on the screen. Here you will see how large the printout will be or the page on which an object will appear. You can check your settings in exactly the same way.

### Creating and modifying reports

Pressing the *Reports* button takes you to another dialog box, in which you can make your settings for the reports. Make sure that you do not rename the standard reports or delete or add chapters from or to them. Reports which you have defined yourself must always be saved under a new name.

The parameters are special to a particular type of object. An object of an object type comprises different components when it is configured. Some settings are optional, others have to be entered. When printing, you can specify whether all or just selected components of the objects should be printed. Figure 15-2 shows, by way of an example, the dialog box in which you can specify the parameters for variables.

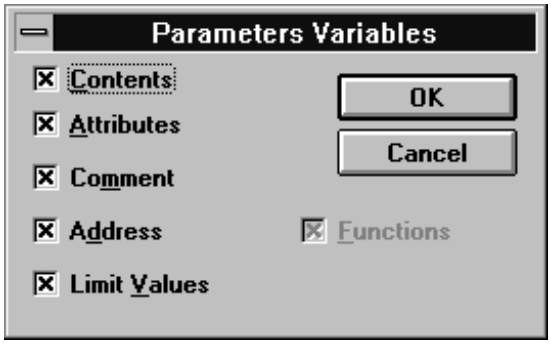



Figure 15-2 Variables Parameters Dialog Box

**Note**

**Printer drivers**

– It might not be possible to print the configuration if you are using CANON drivers. In this instance, printing is aborted.

– With the Apple laser printer, the first line is omitted. When the drivers for the `HP LaserJet III PostScript` or `PostScript Printer` are used, this problem does not occur.

**ASCII character set**

With many printers it may not be sufficient to set the ASCII character set in the configuration only. Make sure that the ASCII character set is set on the printer as well.

# Managing the Configuration 16

**In this chapter**

This chapter describes the file structure of ProTool/Lite and the functions of the Project Manager.

**Special features with STEP 7 integration**

If you have installed ProTool/Lite integrated into STEP 7, the Project Manager of the SIMATIC Manager is replaced. It now lets you copy, move, archive and de-archive projects in exactly the same way as your STEP 7 projects.

## 16.1 File Structure

**File structure of default installation**

Figure 16-1 shows the file structure as created in the default installation.

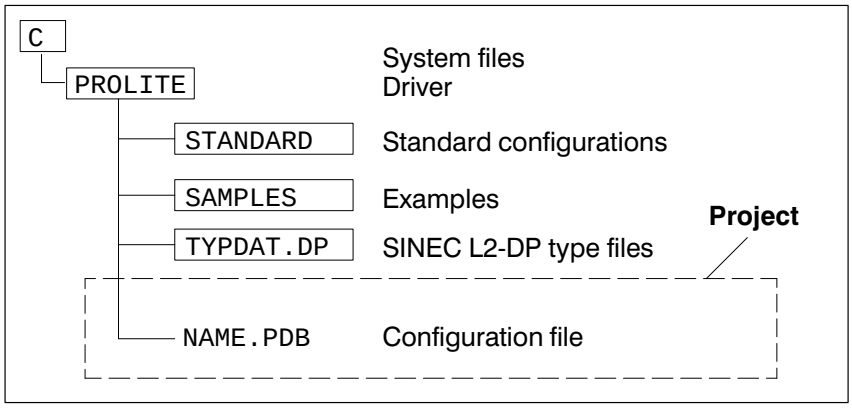



Figure 16-1 File Structure of ProTool/Lite

**PROLITE directory**

All files belonging to the ProTool/Lite program are installed in the `C:\PROLITE` directory. Furthermore, all entries required for initializing ProTool/Lite are made in the Windows directory. ProTool/Lite is installed as separate program group.

**PROLITE/ STANDARD directory**

The directory called `C:\PROLITE\STANDARD` contains all the standard configurations supplied for the different OPs; the standard screens are stored in this directory.

A separate standard configuration is available for every type of device. Table 16-1 shows the names under which standard configurations are installed.

Table 16-1 Standard Configurations

| Standard Configuration | For OP |
|---|---|
| s_05.pdb | OP5 |
| s_07.pdb | OP7 |
| s_15a.pdb | OP15A |
| s_15c4.pdb | OP15C (Display 4x20) |
| s_15c8.pdb | OP15C (Display 8x40) |
| s_17_4.pdb | OP17 (Display 4x20) |
| s_17_8.pdb | OP17 (Display 8x40) |
| s7mpi_03.pdb | OP3 (for MPI connection) |
| s7ppi_03.pdb | OP3 (for serial connection) |
| C7_623.pdb | C7-623 |
| C7_624_4.pdb | C7-624 (Display 4x20) |
| C7_624_8.pdb | C7-624 (Display 8x40) |

The standard configurations already contain standard screens.
Table 16-2 shows the names of the standard screens and the functions implemented in them.

Table 16-2 Standard Screens

| Screen Name | Function | OP3 | OP5 C7-623 | OP7 | OP15 C7-623 | OP17 |
|---|---|---|---|---|---|---|
| Z_SYSTEM_MEN | Standard basic screen.<br>You can branch from this screen to other standard screens | x | x | x | x | x |
| Z_MESS_EVENT | Event messages:<br>– View<br>– Print<br>– Display total number<br>– Delete buffer<br>– Overflow warning ON/OFF<br>– Display text | – | x | x | x | x |
| Z_MESS_ALARM | Alarm messages:<br>– View<br>– Print<br>– Display total number<br>– Delete buffer<br>– Overflow warning ON/OFF<br>– Display text | – | x | x | x | x |
| Z_SETTINGS | System settings: | | | | | |
| | – Mode | x | x | x | x | x |
| | – Display first/last alarm message | – | x | x | x | x |
| | – Display system message buffer | x | x | x | x | x |
| | – Change language | x | x | x | x | x |
| | – Set date and time | x | x | x | x | x |
| | – Printer parameters | x | x | x | x | x |
| | – Interface parameters | x | x | x | x | x |
| Z_SCREEN | Screens: | | | | | |
| | – Edit | x | x | x | x | x |
| | – Print | – | x | x | x | x |
| Z_PASSWORD | Password: | | | | | |
| | – Login | – | x | x | x | x |
| | – Logout | x | x | x | x | x |
| | – Edit | x | x | x | x | x |
| Z_RECORD | Data records: | | | | | |
| | – Edit | – | x | x | x | x |
| | – Print | – | x | x | x | x |
| | – Transfer | – | x | x | x | x |
| Z_COUNTER | Counter target/actual values for S7-CPU314 or S7-CPU214: | | | | | |
| | – Set | x | – | – | – | – |
| | – Display | x | – | – | – | – |
| Z_TIMER | Integrated timer: | | | | | |
| | – Set | x | – | – | – | – |
| | – Display | x | – | – | – | – |

Symbolic names of variables in the standard configuration start with Z_ to distinguish them from other configurations.

Working with standard screens on an OP is described in the Equipment Manuals.

**Note**

Should you wish to use one or more of the standard screens in your configuration, you must use the standard configuration.

When you compile your configuration, a file is created. The file is stored as *name*.fud in the same directory as the configuration file name.pdb.

## 16.2 Project Manager

**Purpose**

The Project Manager contains functions for user-friendly management of the configurations you create with ProTool/Lite. Using Project Manager your project files can be

- backed,
- restored.

**Calling Project Manager**

You call Project Manager by choosing *File → Project Manager*. Should you have installed ProTool/Lite integrated into STEP 7, this menu item is grayed out and is therefore unavailable. The first time you call Project Manager, the dialog box shown in figure 16-2 appears.

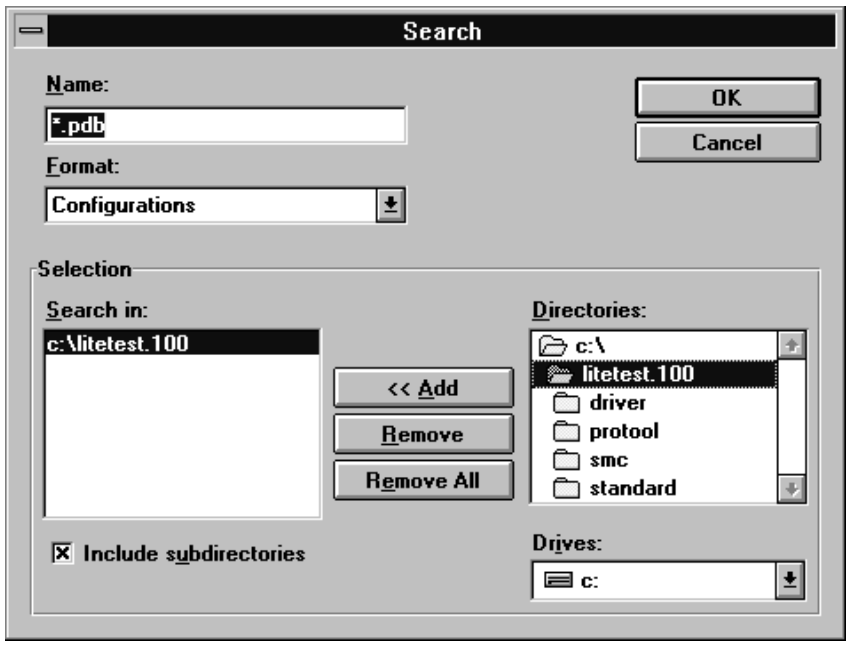



Figure 16-2 Search Dialog Box for Specifying Search Criteria

**File formats**

You specify your search criteria in this dialog box. In this case, you can choose from the following file formats under *Format*:

- configurations (`*.pdb`),
- backups (`*.ar?`) and
- configurations/backups (`*.pdb;*.ar?`).

### Selecting files

Under *Selection,* you set your drive and directories that are important for you. You click *OK* to go to the dialog box shown in figure 16-3. You select the file here. This dialog box also appears if you call Project Manager again. Clicking the *Search* button takes you back to the dialog box shown in figure 16-2.

Figure 16-3 Project Manager Dialog Box

### Project information

When you select a project in the *Project Manager* dialog box, project-related data are displayed.

### Backup and restore

For backing and restoring project files, Project Manager provides the functions *Backup* and *Restore*. Project Manager supports data backup and restore over several floppy disks. This is necessary, in particular, with large configurations for which one floppy disk is too small.

The Backup and Restore dialog boxes are identical in structure. Figure 16-4 shows the Backup dialog box.

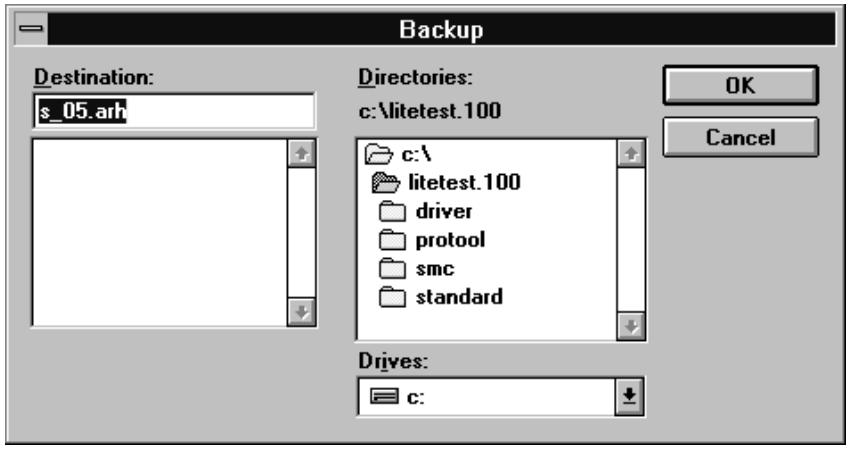



Figure 16-4 Backup Dialog Box

**Starting Backup**

When you wish to back up a configuration, you first choose the configuration file in the *Project Manager* dialog box. In the *Backup* dialog box, you now enter the destination drive and file name of the file you want to back up. Backup is started by clicking the *OK* button.

ProTool/Lite automatically prompts you to replace the floppy disk, if necessary. The backup procedure is interrupted until you insert another floppy disk and confirm it in the displayed dialog box.

Note the floppy disk number on the floppy disk for backups involving more than one floppy disk. This is the only successful way of reading in the backup disks in the correct order.

**Starting Restore**

You restore backups in a similar manner.

# Appendix


**E Description of Functions . . . . . A-1**

A.1 Description of functions . . . . . A-5

**F Code Tables . . . . . B-1**

**G PLC Jobs . . . . . C-1**

C.1 Special Situations – PLC Jobs . . . . . C-9

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# Description of Functions

# A

**In this chapter**

This appendix contains a list of the functions featured in ProTool/Lite. This is followed by a description of the functions.

The functions are listed in alphabetical order. The table similarly contains details on the availability of the functions on the different OPs.

Table A-1 Functions in Alphabetical Order

| Functions and Their Parameters | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Function** | **Parameters** | **OP3** | **OP5** | **OP7** | **OP15** | **OP17** | **C7-623** | **C7-624** |
| Alarms Buffer Overflow | 0 = OFF<br>1 = ON | –<br>– | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x |
| Alarms - Delete buffer | – | – | x | x | x | x | x | x |
| Alarms – Display First/Last | 0 = First<br>1 = Last | –<br>– | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x |
| Alarms - Print buffer | 0 = Chronological<br>1 = Together | –<br>– | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x |
| Data Record: OP→PLC | Recipe name<br>Data record number | –<br>– | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x |
| Data Record: PLC→OP | Recipe name<br>Data record number<br>overwrite y/n | –<br>–<br>– | x<br>x<br>x | x<br>x<br>x | x<br>x<br>x | x<br>x<br>x | x<br>x<br>x | x<br>x<br>x |
| Delete Data Record | Recipe name<br>Data record number | –<br>– | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x |
| Events Buffer Overflow | 0 = OFF<br>1 = ON | –<br>– | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x |
| Events - Delete buffer | – | – | x | x | x | x | x | x |
| Events - Print buffer | 0 = Chronological<br>1 = Together | –<br>– | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x |
| Jump within screen | Entry number<br>Field number | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x |
| Language | 0 = Language 1<br>1 = Language 2<br>2 = Language 3 | x<br>x<br>x | x<br>x<br>x | x<br>x<br>x | x<br>x<br>x | x<br>x<br>x | x<br>x<br>x | x<br>x<br>x |
| Message level | – | x | x | x | x | x | x | x |
| Message Log ON/ OFF | 0 = OFF<br>1 = ON | –<br>– | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x | x<br>x |

Table A-1 Functions in Alphabetical Order

| Functions and Their Parameters | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Function** | **Parameters** | **OP3** | **OP5** | **OP7** | **OP15** | **OP17** | **C7-623** | **C7-624** |
| Mode | 0 = Online | x | x | x | x | x | x | x |
| | 1 = Offline | x | x | x | x | x | x | x |
| | 2 = Download | x | x | x | x | x | – | – |
| | 3 = Loop-through connection | – | – | – | x | x | – | – |
| | 5 = S7 download | x | – | – | – | – | x | x |
| Password Logout | – | x | x | x | x | x | x | x |
| Print all data records | Recipe name | – | x | x | x | x | x | x |
| Print all screens | – | – | x | x | x | x | x | x |
| Print record | Recipe name | – | x | x | x | x | x | x |
| | Data record number | – | x | x | x | x | x | x |
| Print Screen | – | – | x | x | x | x | x | x |
| Print screen entries | Screen Name | – | x | x | x | x | x | x |
| Recipe directory | 2 = Edit | – | x | x | x | x | x | x |
| | 5 = Print | – | x | x | x | x | x | x |
| | 7 = Transfer | – | x | x | x | x | x | x |
| | 11= Save to floppy disk | – | x | x | x | x | x | x |
| | 12= Load from floppy disk | – | x | x | x | x | x | x |
| Scaling linear | `Y = a*X + b`<br>Constant `a`<br>Constant `b` | x | – | x | – | x | – | – |
| Select data record | Recipe name | – | x | x | x | x | x | x |
| | Data record number | – | x | x | x | x | x | x |
| | Entry number | – | x | x | x | x | x | x |
| Select Screen | Screen Name | x | x | x | x | x | x | x |
| | Screen entry | x | x | x | x | x | x | x |
| | Field number | x | x | x | x | x | x | x |
| Select screen directory | 1 = Edit | x | x | x | x | x | x | x |
| | 4 = Print | – | x | x | x | x | x | x |

Table A-1 Functions in Alphabetical Order

| Functions and Their Parameters | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Function** | **Parameters** | **OP3** | **OP5** | **OP7** | **OP15** | **OP17** | **C7-623** | **C7-624** |
| Select Function Screen | Screen name; Field number (for field number refer to table below) | | | | | | | |
| | Selections for screen name: | | | | | | | |
| | Display alarm buffer | – | x | x | x | x | x | x |
| | Display total number of AMs | – | x | x | x | x | x | x |
| | AM overflow warning | – | x | x | x | x | x | x |
| | Delete AM buffer | – | x | x | x | x | x | x |
| | Display EM buffer | – | x | x | x | x | x | x |
| | Display total number of EMs | – | x | x | x | x | x | x |
| | EM overflow warning | – | x | x | x | x | x | x |
| | Delete EM buffer | – | x | x | x | x | x | x |
| | Status variable | x | x | x | x | x | x | x |
| | Force variable | x | x | x | x | x | x | x |
| | Language | x | – | – | – | – | – | – |
| | Language/contrast | – | x | x | x | x | x | x |
| | Change modes | x | x | x | x | x | x | x |
| | Time/date | x | x | x | x | x | x | x |
| | IF1 | – | – | – | x | x | x | x |
| | IF1A (RS232) | – | x | x | – | – | – | – |
| | IF1A (TTY) | – | x | x | – | – | – | – |
| | IF1B | – | x | x | – | – | – | – |
| | IF2 | – | – | – | – | – | x | x |
| | IF2A/B | – | – | – | x | x | – | – |
| | MPI address | x | – | – | – | – | x | x |
| | Printer parameters | – | x | x | x | x | x | x |
| | Display first/last AM | – | x | x | x | x | x | x |
| | Display AM text | – | x | x | x | x | x | x |
| | Display EM text | – | x | x | x | x | x | x |
| | Display sys. msge. buffer | – | x | x | x | x | x | x |
| | Login password | – | x | x | x | x | x | x |
| | Edit password | x | x | x | x | x | x | x |

Table A-2 Fields in Function Screens

| Fields in Function Screens | |
|---|---|
| **Function Screens** | **Fields** |
| Display alarm buffer | – |
| Display total number of AMs | – |
| AM overflow warning | 1 = OFF/ON |
| Delete AM buffer | 1 = Yes/No |
| Display EM buffer | – |
| Display total number of EMs | – |
| EM overflow warning | 1 = OFF/ON |
| Delete EM buffer | 1 = Yes/No |

Table A-2 Fields in Function Screens

| Fields in Function Screens | |
|---|---|
| **Function Screens** | **Fields** |
| Status variable | – |
| Force variable | – |
| Language | 1 = Language 1/2/3 |
| Language/contrast | 1 = Contrast<br>2 = Language 1/2/3 |
| Mode | 1 = Online/Offline/Download/<br>Loop-through connection/<br>S7 download |
| Time/Date | 1 = Date<br>2 = Time |
| IF1 | 1 = Baud rate<br>2 = Data bits<br>3 = Stop bits<br>4 = Parity |
| IF1A | 1 = Baud rate<br>2 = Data bits<br>3 = Stop bits<br>4 = Parity<br>5 = PLC protocol |
| IF1B | 1 = Baud rate<br>2 = Data bits<br>3 = Stop bits<br>4 = Parity<br>5 = PLC protocol |
| IF2A/B | 1 = Baud rate<br>2 = Data bits<br>3 = Stop bits<br>4 = Parity |
| MPI address | 1 = Address |
| Printer parameters | 1 = Characters per line<br>2 = Lines per page<br>3 = Message log ON/OFF |
| Display first/last AM | 1 = ON/OFF |
| Display AM text | – |
| Display EM text | – |
| Display sys. msge. buffer | – |
| Login password | 1 = Password |
| Edit password | 1–20 = Passwords |

## A.1 Description of functions

**Alarms Buffer Overflow**

Enables or disables the warning that the remaining buffer size has been reached. If you press the key on the OP, the value set as the parameter becomes effective.

**Alarms – Delete buffer**

The contents of the alarm buffer are deleted.

**Alarms – Display First/Last**

The first or last message received is displayed. This setting is effective when several alarm messages are queued.

**Alarms – Print buffer**

The contents of the alarm buffer are printed. The parameters determine the order in which messages are fetched from the buffer. With *Chronological*, messages are printed in chronological order. With *Together*, messages having the same message number are printed together.

**Data Record: OP→PLC**

The data record is transferred from the OP to the PLC.

**Data Record: PLC→OP**

The data record is tranferred from the PLC to the OP. The recipe and data record are set by means of the parameter.

**Delete Data Record**

The data record will be deleted. The parameters determine the recipe and the data record.

**Events Buffer Overflow**

Enables or disables the warning that the remaining buffer size has been reached. If you press the key on the OP, the value set as the parameter becomes effective.

**Events – Delete buffer**

The contents of the event buffer are deleted.

**Events – Print buffer**

The contents of the event buffer are printed. The parameters determine the order in which event messages are fetched from the buffer. With *Chronological*, messages are printed in chronological order. With *Together*, messages having the same message number are printed together.

**Jump within screen**

This function allows you to go to a specific screen entry rather than having to scroll through the screen entries. This applies to the currently selected screen only. If you specify the field number, the cursor is already in this field. With a field number of 0, the cursor is positioned at the beginning of the entry.

**Language**
The language is changed on the OP. If you press the key on the OP, the value set as the parameter becomes effective.

**Message Level**
Directly selects the message level.

**Message Log ON/OFF**
Enables or disables automatic printing of messages. If you press the key on the OP, the value set as the parameter becomes effective.

**Mode**
Changes the mode on the OP. When you press the key, the OP changes to the mode specified as the parameter.

**Password Logout**
The user is logged out when the key is pressed. The display on the OP reverts to message level. Password level 0 is now set.

**Print all data records**
All data records of the recipe specified under parameter are printed. The sequence of the printout depends on the data record number.

**Print all screens**
All screens are printed, in screen number order.

**Print record**
Prints the data record of a recipe. The parameters determine the recipe and the data record.

**Print Screen**
The contents you can see on the display are printed.

**Print screen entries**
Prints a screen with all screen entries.

**Recipe directory**
Recipes are listed in numerical order. The parameters refer to the data records. First, select a recipe on the OP, then select the data record.
Depending on the parameters that have been set, the data record has to be edited, it is printed or it is transferred to or from the PLC.
With the OP15, the data record can be saved to floppy disk or can be loaded onto the OP from floppy disk.

**Scaling linear**
`Y = a*X + b`, `Y` = display value/input value
The `X` value read from the PLC is converted linearly before being displayed on the OP as `Y`. `Y` inputs on the OP are likewise converted to `X` before being transferred as a value to the PLC.

**Select data record**

Calls the data record of a recipe.
Specify the data record number to view the data record on the display. Specify the entry number to position the cursor in the entry of the data record. Specify –1 for the data record number or the entry number to position the cursor on the first data record or in the first entry of the first data record.

**Select Function Screen**

A function screen is a screen stored in the firmware. It cannot be modified in the configuration. Function screens implement functions which have already been configured and which you can use to perform settings on the device.
When you specify `-1` as the field number, the cursor is positioned on the first input field.

**Select screen**

Calls a screen.
By specifying the screen entries, you can immediately view the entry on the display. When you specify the field number, the cursor is already positioned in the field.
When you specify `-1` as the screen entry and field number, the cursor is positioned in the first entry or first input field.

**Select screen directory**

Lists the screens in numerical order.
With *Edit*, the selected screen is called and can be edited. With *Print*, the selected screen is printed.

# Code Tables

# B

### Special characters and language-dependent characters

When configuring text for

- messages,
- screens,
- recipes,
- information text,
- symbol lists,
- headers and footers

you can also use special characters and language-dependent characters. You can see the characters on the screen.

### Characters not for display

The OPs cannot display all characters, however. For some versions, language-dependent characters are also loaded with the language. Language-dependent characters such as ä and é cannot be mixed. The following table lists the characters that can be used with the different OPs. If you edit a character that cannot be displayed on the OP, a blank is shown instead on the OP.

### Entering special characters

Special characters can be entered on the keypad. Enter ALT+`0XXX`, `XXX` being the ANSI code in the following table.

Using ALT + GR, you can convert the keyboard to graphic characters. By choosing *Window→ Keyboard* from the menu, you can open a keyboard assignment on the screen. You then enter the graphic characters either by means of the keyboard or the keyboard assignment, in which you click the mouse on the corresponding keys.

### Cyrillic character set

The OP15C also has Cyrillic character capability. Russian text is configured in ProTool/Lite in the same way as for other languages with the Windows standard character set. If you set in ProTool/Lite the configuration language to Russian, the keyboard behaves in the following manner:

- Lower-case letters and some special characters are shown as Cyrillic characters in accordance with the following table.
- Upper-case letters and numerals are displayed in unmodified form.

## Language identifiers

In the following table, letters in parentheses indicate the language. This character is only available when that language is set. The letters stand for the following languages:

| | |
|---|---|
| D | for German |
| E | for English |
| F | for French |
| I | for Italian |
| S | for Spanish |

# PLC Jobs

# C

This part of the Appendix contains a listing of all PLC jobs together with their parameters.

## Description

PLC jobs enable functions such as the following to be triggered on the OP by means of the PLC program:
- Display screen
- Set date and time
- Change general settings

A PLC job consists of 4 data words. The first data word contains the job number. Up to three parameters are transferred in data words 2 to 4, depending on the function. The basic structure of a PLC job is shown in Fig. C-1.

| Address | Left byte (LB) | Right byte (RB) |
|---|---|---|
| 1st word | 0 | Job no. |
| 2nd word | Parameter 1 | |
| 3rd word | Parameter 2 | |
| 4th word | Parameter 3 | |

Figure C-1 Structure of a PLC job

## Listing

The listing shows all the PLC jobs which can be programmed for the various text displays and operator panels, together with their parameters. The **No.** column specifies the PLC job number. Jobs can only ever be triggered **by the PLC** if the TD/OP is in online mode.

| No. | Function | OP5 | OP7 | OP15 | OP17 | C7-623 | C7-624 |
|---|---|---|---|---|---|---|---|
| **1** | **Operating mode selection for OP** | ● | ● | ● | ● | ● | ● |
| | Parameter 1: 1: Offline<br>2: Transfer | | | | | | |
| | Parameters 2, 3: – | | | | | | |
| | The OP cannot be switched to online mode by means of a PLC job! | | | | | | |

| No. | Function | | OP5 | OP7 | OP15 | OP17 | C7-623 | C7-624 |
|---|---|---|---|---|---|---|---|---|
| **3** | **Printout** | | ● | ● | ● | ● | ● | ● |
| | Parameters 1, 2, 3 | – | | | | | | |
| **5** | **Select directory** | | | | | | | |
| | Parameter 1 | 1: Directory: screens, display | ● | ● | ● | ● | ● | ● |
| | | 2: Directory: recipes, display | ● | ● | ● | ● | ● | ● |
| | | 4: Directory: print screens | ● | ● | ● | ● | ● | ● |
| | | 5: Directory: print recipes | ● | ● | ● | ● | ● | ● |
| | | 7: Directory: recipes, data record transfer | ● | ● | ● | ● | ● | ● |
| | Parameters 2, 3 | – | | | | | | |
| **7** | **Print all screens** | | ● | ● | ● | ● | ● | ● |
| | Parameters 1, 2, 3 | – | | | | | | |
| **10** | **Print recipe with all data records** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | Recipe number (1..99) | | | | | | |
| | Parameters 2, 3 | – | | | | | | |
| **11** | **Select special screen** | | | | | | | |
| | The following screens integrated in the firmware can be selected via their (fixed) object numbers. | | | | | | | |
| | Parameter 1 | DL: Cursor inhibit (0 = off/1 = on) | ● | ● | ● | ● | ● | ● |
| | | DR: Special screen number | | | | | | |
| | | **Alarm buffer** | | | | | | |
| | | 1 Buffer output | ● | ● | ● | ● | ● | ● |
| | | 2 Output number of messages | ● | ● | ● | ● | ● | ● |
| | | 3 Overflow warning, on/off | ● | ● | ● | ● | ● | ● |
| | | 4 Delete buffer, yes/no | ● | ● | ● | ● | ● | ● |
| | | **Event buffer** | | | | | | |
| | | 5 Buffer output | ● | ● | ● | ● | ● | ● |
| | | 6 Output number of messages | ● | ● | ● | ● | ● | ● |
| | | 7 Overflow warning, on/off | ● | ● | ● | ● | ● | ● |
| | | 8 Delete buffer, yes/no | ● | ● | ● | ● | ● | ● |
| | | **PU functions** | | | | | | |
| | | 25 Status VAR | ● | ● | ● | ● | ● | ● |
| | | 26 Control VAR | ● | ● | ● | ● | ● | ● |
| | | **Special functions** | | | | | | |
| | | 30 Language selection, brightness (contrast) | ● | ● | ● | ● | ● | ● |
| | | 31 Change operating mode | ● | ● | ● | ● | ● | ● |
| | | **Settings** | | | | | | |
| | | 35 Set date/time | ● | ● | ● | ● | ● | ● |
| | | 36 Internal interface (OP5/OP7: V.24; OP15/OP17: IF11) | ● | ● | ● | ● | ● | ● |
| | | 37 Module interface (OP5/OP7: TTY; OP15/OP17: IF2) | ● | ● | ● | ● | ● | ● |
| | | 38 Printer parameters | ● | ● | ● | ● | ● | ● |
| | | 40 Message type | ● | ● | ● | ● | ● | ● |
| | | **Message texts** | | | | | | |
| | | 45 Display alarm texts | ● | ● | ● | ● | ● | ● |
| | | 46 Display event texts | ● | ● | ● | ● | ● | ● |
| | | **System messages** | | | | | | |
| | | 50 Output system message buffer | ● | ● | ● | ● | ● | ● |

| No. | Function | | OP5 | OP7 | OP15 | OP17 | C7-623 | C7-624 |
|---|---|---|---|---|---|---|---|---|
| | | **Password** | | | | | | |
| | | 55 Login | ● | ● | ● | ● | ● | ● |
| | | 56 Password entry | ● | ● | ● | ● | ● | ● |
| | Parameters 2, 3 | – | | | | | | |
| **12** | **Enable/disable message log** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | 0: Off<br>1: On | | | | | | |
| | Parameters 2, 3 | – | | | | | | |
| **13** | **Change language** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | 0: 1st language<br>1: 2nd language<br>2: 3rd language | | | | | | |
| | Parameters 2, 3 | – | | | | | | |
| **14** | **Set time (BCD-coded)** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | DL: –<br>DR: Hours (0..23) | | | | | | |
| | Parameter 2 | DL: Minutes (0..59)<br>DR: Seconds (0..59) | | | | | | |
| | Parameter 3 | – | | | | | | |
| **15** | **Set date (BCD-coded)** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | DL: –<br>DR: Day (1..7: Sunday...Saturday) | | | | | | |
| | Parameter 2 | DL: Date (1..31)<br>DR: Month (1..12) | | | | | | |
| | Parameter 3 | DL: Year | | | | | | |
| **16** | **Internal interface parameters** (OP5/OP7: V.24; OP15/OP17: IF1) | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | Value for parameter 2<br>**Baud rate** (only for FAP and printer)<br>0: 300 baud<br>1: 600 baud<br>2: 1200 baud<br>3: 2400 baud<br>4: 4800 baud<br>5: 9600 baud<br>6: 19200 baud (only for FAP)<br>**Data bits** (only for FAP and printer)<br>0: 7 data bits<br>1: 8 data bits<br>**Stop bits** (only for FAP and printer)<br>0: 1 stop bit<br>1: 2 stop bits<br>**Parity** (only for FAP and printer)<br>0: Even<br>1: Odd<br>2: None | | | | | | |

| No. | Function | | OP5 | OP7 | OP15 | OP17 | C7-623 | C7-624 |
|---|---|---|---|---|---|---|---|---|
| | | **OP address** 1..30 (only for SINEC L1) | | | | | | |
| | Parameter 2 | Interface parameters to be set<br>0: Baud rate<br>1: Data bits<br>2: Stop bits<br>3: Parity<br>4: OP address (only for SINEC L1) | | | | | | |
| | Parameter 3 | – | | | | | | |
| **17** | **Module interface parameters** (OP5/OP7: TTY; OP15/OP17: IF22) | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | Value for parameter 2 | | | | | | |
| | | **Baud rate** (only for FAP)<br>0: 300 baud<br>1: 600 baud<br>2: 1200 baud<br>3: 2400 baud<br>4: 4800 baud<br>5: 9600 baud<br>6: 19200 baud | | | | | | |
| | | **Data bits** (only for FAP)<br>0: 7 data bits<br>1: 8 data bits | | | | | | |
| | | **Stop bits** (only for FAP)<br>0: 1 stop bit<br>1: 2 stop bits | | | | | | |
| | | **Parity** (only for FAP)<br>0: Even<br>1: Odd<br>2: None | | | | | | |
| | | **OP address** 3..122 (for SINEC L2-DP) | | | | | | |
| | Parameter 2 | Interface parameters to be set<br>0: Baud rate<br>1: Data bits<br>2: Stop bits<br>3: Parity<br>4: OP address<br>(only for SINEC L1, SINEC L2 and SINEC L2-DP)<br>5: PLC address (only for SINEC L2)<br>6: OP-SAP (only for SINEC L2)<br>7: PLC-SAP (only for SINEC L2) | | | | | | |
| | Parameter 3 | – | | | | | | |

| No. | Function | | OP5 | OP7 | OP15 | OP17 | C7-623 | C7-624 |
|---|---|---|---|---|---|---|---|---|
| **19** | **Printer parameters** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | Value for parameter 2<br>**Number of characters/line**<br>0: 20 characters/line<br>1: 40 characters/line<br>2: 80 characters/line<br>**Number of lines/page**<br>0: 60 lines/page<br>1: 61 lines/page<br>...<br>12: 72 lines/page | | | | | | |
| | Parameter 2 | Printer parameters to be set<br>0: Number of characters per line<br>1: Number of lines per page | | | | | | |
| | Parameter 3 | – | | | | | | |
| **21** | **Type of display, alarm messages** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | 0: First value (oldest message)<br>1: Last value (latest message) | | | | | | |
| | Parameters 2, 3 | – | | | | | | |
| **22** | **Set display contrast** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | 0..15 | | | | | | |
| | Parameters 2, 3 | – | | | | | | |
| **23** | **Set password level** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | 1..9<br>(1 = lowest password level,<br>9 = highest password level) | | | | | | |
| | Parameters 2, 3 | – | | | | | | |
| **24** | **Password logout** | | ● | ● | ● | ● | ● | ● |
| | Parameters 1, 2, 3 | – | | | | | | |
| **29** | **Print nproduction report** | | ● | ● | ● | ● | ● | ● |
| | Parameters 1, 2, 3 | – | | | | | | |
| **31** | **Print alarm buffer** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | 0: Print chronologically<br>1: Print together | | | | | | |
| | Parameters 2, 3 | – | | | | | | |
| **32** | **Print event buffer** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | 0: Print chronologically<br>1: Print together | | | | | | |
| | Parameters 2, 3 | – | | | | | | |
| | Parameters 1, 2, 3 | – | | | | | | |
| **37** | **Enable/disable overflow warning for event messages** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | 0: Off<br>1: On | | | | | | |
| | Parameters 2, 3 | – | | | | | | |

| No. | Function | OP5 | OP7 | OP15 | OP17 | C7-623 | C7-624 |
|---|---|---|---|---|---|---|---|
| **38** | **Enable/disable overflow warning for alarm messages** | ● | ● | ● | ● | ● | ● |
| | Parameter 1 0: Off<br>1: On | | | | | | |
| | Parameters 2, 3 – | | | | | | |
| **41** | **Transfer date/time to PLC** | ● | ● | ● | ● | ● | ● |
| | Triggering this job too often may overload the TD/OP since two transfers to the PLC are required for each job. | | | | | | |
| | Parameters 1, 2, 3 – | | | | | | |
| **42** | **Fetch LED area from PLC** | – | ● | ● | ● | – | ● |
| | Parameter 1 Block number 1..4 | | | | | | |
| | Parameters 2, 3 – | | | | | | |
| **43** | **Fetch event bit area from PLC** | ● | ● | ● | ● | ● | ● |
| | Parameter 1 Block number: 1..4 | | | | | | |
| | Parameters 2, 3 – | | | | | | |
| **44** | **Fetch alarm bit area from PLC** | ● | ● | ● | ● | ● | ● |
| | Parameter 1 Block number: 1..4 | | | | | | |
| | Parameters 2, 3 – | | | | | | |
| **45** | **Fetch acknowledgment area from PLC** | ● | ● | ● | ● | ● | ● |
| | Parameter 1 Block number: 1..4 | | | | | | |
| | Parameters 2, 3 – | | | | | | |
| **47** | **Transfer LED area directly to OP** | – | ● | ● | ● | – | ● |
| | Parameter 1 LED assignment area number: 1..4 | | | | | | |
| | Parameter 2 LED assignment: 1st word | | | | | | |
| | Parameter 3 LED assignment: 2nd word | | | | | | |
| | Unlike with job **no. 42**, the LED assignment is transferred directly with the PLC job, so that the LEDs are driven faster. The specified LED area must not be configured larger than 2 DW! | | | | | | |
| **49** | **Delete event buffer** | ● | ● | ● | ● | ● | ● |
| | Parameters 1, 2, 3 – | | | | | | |
| **50** | **Delete alarm buffer** | ● | ● | ● | ● | ● | ● |
| | Parameters 1, 2, 3 – | | | | | | |
| **51** | **Select screen** | ● | ● | ● | ● | ● | ● |
| | Parameter 1 DL: Cursor inhibit (0: off; 1: on) | ● | ● | ● | ● | ● | ● |
| | DR: Screen number 1..99 | ● | ● | ● | ● | ● | ● |
| | Parameter 2 Entry number: 0..99<br>(0: Cursor positioned to first entry) | ● | ● | ● | ● | ● | ● |
| | Parameter 3 Field number: 0..8<br>Output fields are ignored by the serial numbering system! | ● | ● | ● | ● | ● | ● |

| No. | Function | | OP5 | OP7 | OP15 | OP17 | C7-623 | C7-624 |
|---|---|---|---|---|---|---|---|---|
| | | Note on:<br>The input fields of an entry are numbered consecutively:<br>0 Entry number field<br>1 First input field<br>:<br>n Last input field<br>The numbering of the input fields starts at 1 again for each entry. | | | | | | |
| **52** | **Print screen** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | Screen number (1..99), format: KY | | | | | | |
| | Parameters 2, 3 | – | | | | | | |
| **53** | **Select recipe** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | DL: Cursor inhibit (0: off; 1: on)<br>DR: Recipe number (1..99) | | | | | | |
| | Parameter 2 | Data record number (1..99) | | | | | | |
| | Parameter 3 | DL: Entry number (0..99)<br>(0: Cursor positioned to first entry)<br>DR: Field number (0/1)<br>The input fields of an entry are numbered consecutively:<br>0 Entry number field<br>1 First input field<br>:<br>n Last input field<br>The numbering of the input fields starts at 1 again for each entry. | | | | | | |
| | | Output fields are ignored by the serial numbering system! | | | | | | |
| **54** | **Print recipe** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | Recipe number (1..99) | | | | | | |
| | Parameter 2 | Data record number (1..99) | | | | | | |
| | Parameter 3 | – | | | | | | |
| **69** | **Transfer recipe data record to OP** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | Recipe number: 1..99 | | | | | | |
| | Parameter 2 | Data record number: 1..99 | | | | | | |
| | Parameter 3 | 0,1<br>0: Data record is not overwritten.<br>1: Data record is overwritten. | | | | | | |
| **70** | **Transfer recipe data record from OP to PLC** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | Recipe number: 1..99 | | | | | | |
| | Parameter 2 | Data record number: 1..99 | | | | | | |
| | Parameter 3 | – | | | | | | |
| **71** | **Partial screen update** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | 0: Off<br>1: On | | | | | | |
| | Parameters 2, 3 | – | | | | | | |
| | Trigger this job only when no screen is selected. | | | | | | | |

| No. | Function | | OP5 | OP7 | OP15 | OP17 | C7-623 | C7-624 |
|---|---|---|---|---|---|---|---|---|
| **72** | **Cursor positioning** on current screen or in current recipe | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | Entry number: 0..99 | ● | ● | ● | ● | ● | ● |
| | Parameter 2 | Field number: 0..8 | ● | ● | ● | ● | ● | ● |
| | Parameter 3 | Cursor inhibit (0: off; 1: on) | ● | ● | ● | ● | ● | ● |
| **73** | **Cursor positioning** on current special screen | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | Field number (0..8) | | | | | | |
| | Parameter 2 | Cursor inhibit (0: off; 1: on) | | | | | | |
| | Parameter 3 | – | | | | | | |
| **74** | **Keyboard simulation** | | ● | ● | ● | ● | ● | ● |
| | Parameter 1 | DL: Keyboard number<br>1 internal function keyboard<br>2 system keyboard | | | | | | |
| | | DR: Password level<br>0: Is evaluated<br>1: Is not evaluated | | | | | | |
| | Parameter 2 | DL: First key code<br>DR: Second key code<br>(If only **one** key operation is to be simulated, the second key code must be set to `0`.) | | | | | | |
| | | A diagram of the key codes can be found in section C.2. | | | | | | |
| | Parameter 3 | – | | | | | | |
| | When the keyboard is simulated by means of a PLC job, the transfer time from the PLC to the OP is important. An acknowledgment of an alarm message by means of a keyboard simulation in the PLC program, for example, may lead to an unwanted result if:<br>– This alarm message has already been acknowledged by means of an operator action on the OP,<br>– A new alarm message or system message is received before the job is evaluated. | | | | | | | |

# C.1 Special Situations – PLC Jobs

**PLC jobs with cursor inhibited**

The selected input field can no longer be exited with the arrow keys or the ESC key if the ”cursor inhibited” parameter is not specified as 0 in one of jobs 11, 51, 53, 72 and 73. The cursor inhibit cannot be canceled until one of the following actions is taken:

- Repetition of the job with cursor inhibit = 0
- Another job which causes a change in the indication on the display

The system message “`$400 Invalid entry`” is displayed if an attempt is made to exit the entry field while the cursor is inhibited.

## C.2 Key Codes

The key codes are shown below. These codes are required, for example, for PLC job no. 74 (keyboard simulation).

**Function keys**

**OP5**:
F1...F6: 1...6

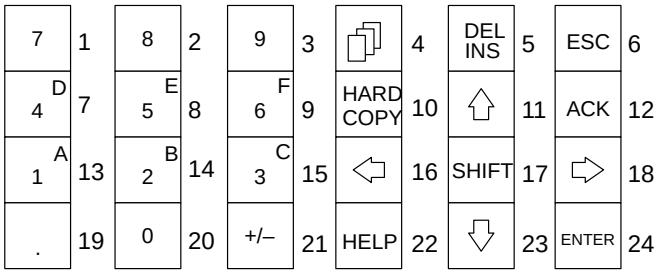
**OP7**:
F1...F4: 1...4
K1...K4 5...8

**OP15, C7-623, C7-624**:
F1...F16: 1...16

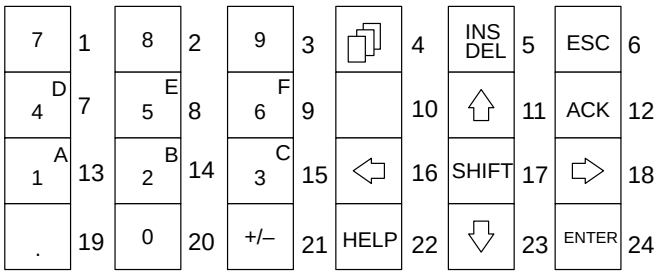
**OP17**:
F1...F8: 1...8
K1...K16 9...24

**System keys**

**OP5 and OP15, C7-623 and C7-624**:




**OP7 and OP17**:



# Siemens Worldwide

# D

**In this Appendix**

In this appendix you will find a list of:

- All cities in the Federal Republic of Germany with Siemens Sales Offices and
- All European and non-European Siemens Companies and Representatives

**Siemens Sales Offices in the Federal Republic of Germany**

The following table lists all Siemens Sales Offices in the Federal Republic of Germany.

| | |
|---|---|
| Aachen | Kassel |
| Augsburg | Kempten/Allg. |
| Bayreuth | Kiel |
| Berlin | Laatzen |
| Bielefeld | Leipzig |
| Bonn | Lingen |
| Bremen | Magdeburg |
| Brunswick | Mainz |
| Chemnitz | Mannheim |
| Coblenz | Munich |
| Cologne | Münster/Westf. |
| Constance | Nuremberg |
| Darmstadt | Osnabrück |
| Dortmund | Regensburg |
| Dresden | Rostock |
| Duisburg | Saarbrücken |
| Düsseldorf | Siegen |
| Erfurt | Stuttgart |
| Essen | Ulm |
| Frankfurt am Main | Wetzlar |
| Freiburg | Wilhelmshaven |
| Hamburg | Wuppertal |
| Heilbronn | Würzburg |
| Karlsruhe | |

## European Companies and Representatives

The following table lists all European Siemens Companies and Representatives.

**Austria**

Siemens AG Österreich

- Bregenz
- Graz
- Innsbruck
- Linz
- Salzburg
- Vienna

**Belgium**

Siemens S.A.

- Brussels
- Liège

Siemens N. V.

- Antwerp

**Bosnia-Herzegovina**

Generalexport Predstavnistvo Sarajevo

- Sarajevo

**Bulgaria**

Siemens AG, Bulgaria Representative

- Sofia

**Croatia**

Siemens d. o. o.

- Zagreb

**Cyprus**

GEVO Ltd.

or

Jolali Ltd.

- Nicosia

**Czech Republic**

Siemens AG

- Brno
- Mladá Boleslav
- Prague

**Denmark**

Siemens A/S

- Copenhagen, Ballerup

**Finland**

Siemens Oy

- Espoo, Helsinki

**France**

Siemens S.A.

- Haguenau
- Lille, Seclin
- Lyon, Caluire-et-Cuire
- Marseille
- Metz
- Paris, Saint-Denis
- Strasbourg
- Toulouse

**Great Britain**

Siemens plc

- Birmingham, Walsall
- Bristol, Clevedon
- Congleton
- Edinburgh
- Glasgow
- Leeds
- Liverpool
- London, Sunbury-on-Thames
- Manchester
- Newcastle

**Greece**

Siemens A.E.

- Athens, Amaroussio
- Thessaloniki

**Hungaria**

Siemens Kft

- Budapest

**Iceland**

Smith & Norland H/F

- Reykjavik

**Ireland**

Siemens Ltd.

- Dublin

**Italy**

Siemens S.p.A.

- Bari
- Bologna
- Brescia
- Casoria
- Florence
- Genoa
- Milan
- Padua
- Rome
- Turin

**Luxemburg**

Siemens S.A.

- Luxemburg

**Malta**

J. R. Darmanin & Co. Ltd.

- Valletta

**Netherlands**

Siemens Nederland N.V.

- The Hague
- Rijswijk

**Norway**

Siemens A/S

- Bergen
- Oslo
- Stavanger
- Trondheim

**Poland**

Siemens GmbH

- Gdansk-Letnica
- Katowice
- Warsaw

**Portugal**

Siemens S.A.

- Albufeira
- Coímbra
- Lisbon, Amadora
- Matosinhos
- Porto

**Romania**

Siemens birou de consultatii tehnice

- Bukarest

**Russia**

Siemens AG

or

Mosmatic

- Moscow

Siemens AG

- Ekaterinburg

**Slovak Republic**

Siemens AG

- Bratislava

**Slovenia**

Siemens d. o. o.

- Ljubljana

**Spain**

Siemens S.A.

- Barcelona
- Bilbao
- Gijón
- Granada
- La Coruña
- Las Palmas de Gran Canaria
- León
- Madrid
- Málaga
- Murcia
- Palma de Mallorca
- Pamplona
- Sevilla
- Valencia
- Valladolid
- Vigo
- Zaragoza

**Sweden**

Siemens AB

- Göteborg
- Jönköping
- Malmö
- Sundsvall
- Upplands Väsby, Stockholm

**Switzerland**

Siemens-Albis AG

- Basel
- Bern
- Zürich

Siemens-Albis S.A.

- Renens, Lausanne

**Turkey**

SIMKO

- Adana
- Ankara
- Bursa
- Istanbul
- Izmir
- Samsun

**Ukraine**

Siemens AG

- Kiev

## Non-European Companies and Representatives

The following table lists all non-European Siemens Companies and Representatives of Siemens AG.

## Africa

The following table lists all Siemens Companies and Representatives of Siemens AG in Africa.

**Algeria**

Siemens Bureau d'Alger

- Alger

**Angola**

TECNIDATA

- Luanda

**Bophuthatswana**

Siemens Ltd.

- Mafekeng

**Egypt**

Siemens Technical Office

- Cairo-Mohandessin

Siemens Technical Office

- Alexandria

EGEMAC S.A.E.

- Cairo-Mattaria

**Ethiopia**

Addis Electrical Engineering Ltd.

- Addis Abeba

**Ivory Coast**

Siemens AG

- Abidjan

**Libya**

Siemens AG, Branch Libya

- Tripoli

**Morocco**

SETEL

Société Electrotechnique et de Télécommunications S.A.

- Casablanca

**Mozambique**

Siemens Liaison Office

- Maputo

**Namibia**

Siemens (Pty.) Ltd.

- Windhoek

**Nigeria**

Electro Technologies Nigeria Ltd. (ELTEC)

- Lagos

**Rwanda**

Etablissement Rwandais

- Kigali

**Sambia**

Electrical Maintenance Lusaka Ltd.

- Lusaka

**Simbabwe**

Electro Technologies Corporation (Pvt.) Ltd. (ETC)

- Harare

**South Africa**

Siemens Ltd.

- Cape Town
- Durban
- Johannesburg
- Middelburg
- Newcastle
- Port Elizabeth
- Pretoria

**Sudan**

National Electrical & Commercial Company (NECC)

- Khartoum

**Swaziland**

Siemens (Pty.) Ltd.

- Mbabane

**Tanzania**

Tanzania Electrical Services Ltd.

- Dar-es-Salaam

**Tunesia**

Sitelec S.A.

- Tunis

**Zaire**

SOFAMATEL S.P.R.L.

- Kinshasa

## America

The following table lists all Siemens Companies and Representatives of Siemens AG in America.

**Argentina**

Siemens S.A.

- Bahía Blanca
- Buenos Aires
- Còrdoba
- Mendoza
- Rosario

**Bolivia**

Sociedad Comercial é Industrial Hansa Ltda.

- La Paz

**Brazil**

Siemens S.A.

- Belém
- Belo Horizonte
- Brasilia
- Campinas
- Curitiba
- Fortaleza
- Pôrto Alegre
- Recife
- Rio de Janeiro
- Salvador de Bahia
- São Paulo
- Vitória

**Canada**

Siemens Electric Ltd.

- Montreal, Québec
- Toronto

**Chile**

INGELSAC

- Santiago de Chile

**Colombia**

Siemens S.A.

- Barranquilla
- Bogotá
- Cali
- Medellín

**Costa Rica**

Siemens S.A.

- Panama
- San José

**Cuba**

Respresentación

Consult iva EUMEDA

- La Habana

**Ecuador**

Siemens S.A.

- Quito

**El Salvador**

Siemens S.A.

- San Salvador

**Guatemala**

Siemens S.A.

- Ciudad de Guatemala

**Honduras**

Representaciones Electroindustriales S de R.L. - Relectro

- Tegucigalpa

**Mexico**

Siemens S.A. de CV

- Culiacán
- Gómez Palacio
- Guadalajara
- León
- México, D.F.
- Monterrey
- Puebla

**Nicaragua**

Siemens S.A.

- Managua

**Paraguay**

Rieder & Cia. S.A.C.I.

- Asunción

**Peru**

Siemsa

- Lima

**United States of America**

Siemens Industrial Automation Inc.

Automation Division

- Alpharetta, GA

Numeric Motion Control

- Elk Grove Village, Illinois

**Uruguay**

Conatel S.A.

- Montevideo

**Venezuela**

Siemens S.A.

- Caracas
- Valencia

## Asia

The following table lists all Siemens Companies and Representatives of Siemens AG in Asia.

**Bahrain**

Transitec Gulf

- Manama

**Bangladesh**

Siemens Bangladesh Ltd.

- Dhaka

**Brunei**

- Brunei Darussalam

**Hong Kong**

Siemens Ltd.

- Hong Kong

**India**

Siemens Limited

- Ahmedabad
- Bangalore
- Bombay
- Calcutta
- Madras
- New Delhi
- Secúnderabad

**Indonesia**

P.T. Siemens Indonesia, P.T. Siemens Dian-Grana Elektrika, Representative Siemens AG

- Jakarta

**Iraq**

Samhiry Bros. Co. Limited

or

Siemens AG (Iraq Branch)

- Baghdad

**Iran**

Siemens S.S.K.

- Teheran

**Japan**

Siemens K.K.

- Tokyo

**Korea**

Siemens Ltd.

- Changwon
- Seoul
- Ulsan

**Kuwait**

National & German Electrical and Electronic Services Co. (NGEECO)

- Kuwait, Arabia

**Lebanon**

Ets. F.A. Kettaneh S.A.

- Beirut

**Malaysia**

Siemens Electrical Engineering Sdn. Bhd.

- Kuala Lumpur

**Nepal**

Amatya Enterprises (Pvt.) Ltd.

- Kathmandu

**Oman**

Waleed Associates

- Muscat

**Pakistan**

Siemens Pakistan Engineering Co., Ltd.

- Islamabad
- Karachi
- Lahore
- Peshawar
- Quetta

**People's Republic of China**

Siemens AG Representation

- Beijing
- Guangzhou
- Shanghai

**Philippine Islands**

Maschinen & Technik Inc. (MATEC)

- Manila

**Qatar**

Trags Electrical Engineering and Air Conditioning Co.

- Doha

**Saudi Arabia**

Arabia Electric Ltd. (Equipment)

- Al-Khobar
- Jeddah
- Riyadh

**Singapore**

Siemens (Pte.) Ltd.

- Singapore

**Sri Lanka**

Dimo Limited

- Colombo

**Syria**

Siemens AG, Branch (A.S.T.E.)

- Damascus

**Taiwan**

Siemens Ltd., TELEUNION Engineering Ltd.

or

TAI Engineering Co., Ltd.

- Taichung
- Taipei

**Thailand**

Berti Jucker Co. Ltd.

- Bangkok

**United Arab Emirates**

Electro Mechanical Co.

or

Siemens Resident Engineers

- Abu Dhabi

Scientechnic

or

Siemens Resident Engineers

- Dubai

**Vietnam**

OAV Representative Office

- Hanoi

**Yemen (Arab. Republic)**

Tihama Tractors & Engineering Co., Ltd.

or

Siemens Resident Engineers

- Sanaa

## Australia

The following table lists all Siemens Companies and Representatives of Siemens AG in Australia

**Australia**

Siemens Ltd.

- Adelaide
- Brisbane
- Melbourne
- Perth
- Sydney

**New Zealand**

Siemens Ltd.

- Auckland
- Wellington

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